FOUNDED BY DR. MAX THOREK

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

Vol. XVIII SEPTEMBER, 1952 No. 3

Original Articles

Mesenteric Chylous Cysts

Associated Diagnostic and Surgical Problems

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MESENTERIC cysts and other cysts of the abdomen are of special interest to the surgeon who is faced with the problem of making a differential diagnosis of an unexplained abdominal mass. Despite their infrequent occurrence, mesenteric cysts present numerous and often perplexing problems in diagnosis and surgical treatment. Occasionally tumors in the mesentery are situated in such close proximity to the pelvic brim as to suggest a mass of the genital tract. More often, as was the case in the situation to be described, these masses occur in close proximity to vital abdominal structures, and their removal requires a surgical procedure of considerable magnitude. The close relation of these masses to the surrounding intra-abdominal and retroperitoneal structures makes it necessary for surgeons, urologists, gastroenterologists and gynecologists to have a precise concept of this group of tumors.

Although the first report on mesenteric cysts is attributed to Benevience,[1] a Florentine anatomist, Rokitansky[2] published the first accurate description of a chylous cyst observed at autopsy. Marsupialization of a chylous cyst with recovery of the patient was reported by Pean[3] in 1883. Tillaux[4] is credited with

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Read by Dr. Mendillo at the Eighth International Congress of the International College of Surgeons, Madrid, Spain, May 1952.
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Submitted for publication June 16, 1952.

the first successful cure of a mesenteric cyst in 1888. The literature on retroperitoneal chylous cysts, with special reference to the lymphangiomas, was summarized in 1939 by Gerster.[5] Reports of retroperitoneal chylous cysts are rare. Lee[6] has pointed out that, despite the fact that new cases of retroperitoneal chylous cysts are being constantly reported, a total of approximately 20 cases had been recorded in the literature up to 1942. Beahrs and Judd[7] have noted approximately 174 cysts of the omentum, mesentery and retroperitoneal area in more than 1,000,000 patients at the Mayo Clinic. At least 7 of these were chylous in origin. Slocum[8] recorded 6 cases of chylous mesenteric cyst from the files of the Massachusetts General Hospital from 1900 to 1926. One case was reported from the Los Angeles General Hospital from a group of over 188,000 admissions. In the period 1942 to 1947, Beahrs, Judd and Dockerty[9] recorded 2 additional cases. Roller[10] and Warfield[11] have stated that approximately 500 cases of mesenteric cyst have been recorded in the literature. It is estimated that 200 to 300 of these mesenteric cystic masses are chylous in origin.

That these cysts are diagnosed with difficulty has been previously noted, but that they may also produce grave surgical complications has not been previously emphasized. Thus, at times the cysts are small and produce no appreciable symptoms, as is demonstrated in some of our cases. In other cases, however, because of the size of the cyst, traction, compression or torsion of the bowel by the cyst may alter the blood supply and produce acute or chronic intestinal obstruction. Several authors have described the serious effects of hemorrhage into such cysts. Others have described the rupture of such cysts into the abdomen. Although malignant degeneration of such

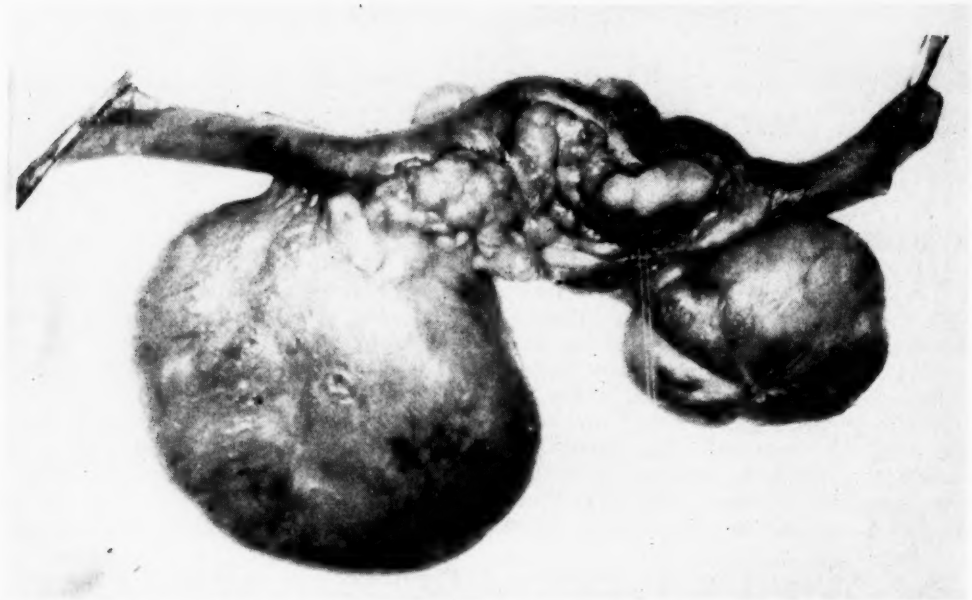

Fig. 1 (*Case 1; patient S.H.*).—The section of resected ileum is demonstrated with the attached mesenteric cyst. The larger cyst was approximately the size of a large grapefruit. The smaller cyst, situated to the right, was approximately the size of a navel orange. Note the distortion and the narrowing of the bowel near the site of attachment of the cyst near the mesenteric margin. The photograph adequately demonstrates the reason for the compression and elongation of the bowel wall with narrowing of the intestinal lumen by the mesenteric chylous cyst.

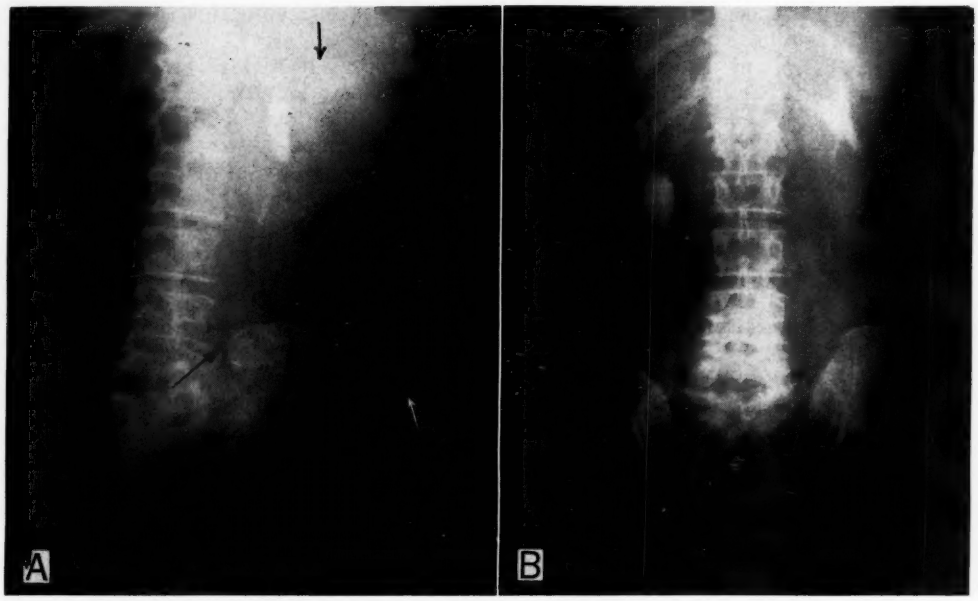

Fig. 2 (*Case 2; patient D.McC.*).—*A*, arrows outline the large homogeneous density arising in the region of the left upper and quadrant and the left mid area. The superior and inferior margins of the mass are outlined by a sharply delineated translucency. Note that all of the bowel loops have been displaced away from the mass. At operation a large gray-surfaced chylous mesenteric cyst was found. Enormously dilated lacteals entering at the base of the cyst were demonstrated at operation. *B*, displacement of the mesentery near the proximal segments of the ileum despite the position of the mass between the leaves of the jejunal mesentery.

cysts has been noted by several investigators, it is thought to be relatively rare. Recently, reports of such degenerative changes have been noted in the literature.

The purpose of this paper is to review the symptoms, diagnosis, classification and pathologic picture associated with these masses and to present our experience with this particular group of tumors. The material was obtained from a review of the literature and from our own group of 8 cases of proved chylous mesenteric cyst treated at the Grace Unit of the New Haven Community Hospital in the fifteen-year period from January 1934 to January 1951 inclusive. Three additional mesenteric cysts seen at other hospitals were subsequently added to this group. Since the problems encountered with chylous mesenteric cyst and mesenteric cyst were similar, all of these cases are presented together.

The term "mesenteric cyst" includes any cystic structure that lies between the folds of the mesentery or beneath the serosa of the intestine. In this paper the retroperitoneal tumors have not been included. Mesenteric cysts have little in common except their position. The etiologic background, the embryonic genesis and the cellular structures, as well as the contents, vary greatly.

Confusion with regard to the cause and development of mesenteric cysts has only been increased by the numerous classifications of structure that have been published. Many authors have considered the chylous cyst an accumulation of chyle in a preexisting cyst, arguing that such cysts do not arise from congenital abnormalities or from obstruction of the lacteal

or lymphatic channels, and that, because of the rich anastomosis of lymph vessels in the mesentery and the retroperitoneal region, an obstructing lymphangitic cyst could not occur. Other investigators, however, have concluded that the cysts are of embryonic origin and exist as distinct entities.

A simple and adequate classification presented by Ewing[12] is as follows: (1) lymphatic or chylous; (2) enteric; (3) urogenital, and (4) dermoid and teratoid. A more detailed classification has been given by Peterson:[13]

1. Embryonic cysts
   a. Cysts arising from embryonic remnants and sequestrated tissue. These may be serous, chylous, sanguineous or dermoid.
   b. Cysts of intestinal orgigin, arising (1) as a result of sequestration from the bowel or (2) from diverticula of the concave side of the bowel, thus reaching an intramesenteric position.
   c. Cysts arising from urogenital organs, germinal epithelium, ovary, wolffian body or müllerian duct.
2. Pseudocysts
   a. Pseudocysts of infective origin: (1) hydatid cysts or (2) degenerated tuberculous disease.
   b. Cystic malignant disease.

Some attention should be paid to the fact that although the tumor appears to be situated in the mesentery it may actually originate and even be attached to the posterior parietal wall of the abdominal cavity. Several of the masses may have stalks that originate in the space behind the posterior wall of the peritoneum. Some of these tumors appear to arise from the embryonal ridges and from the structures contained in the retroperitoneal area. During the development of these masses, they may displace the abdominal viscera from the posterior abdominal wall. The tumors may then extend into the mesentery of the large and small intestine and into the pelvic connective tissues and the sigmoid mesocolon.

Thus, Hansmann and Budd[14] in 1932 studied in detail 17 cases of primary retroperitoneal tumors and showed that the histologic picture of these masses was similar to that of tumors arising in the adult urogenital apparatus. On the basis of this study these authors offered an excellent paper concerning the histogenesis of primary retroperitoneal tumors. From the embryonal standpoint, they presented the manner in which the retroperitoneal and some intra-abdominal tumors may arise from the remnants of the urogenital apparatus. Hansmann and Budd[14] pointed out that when muscles and vertebrae form the urogenital structures are displaced forward. At this time bits of ectoderm may be carried forward with the genitourinary apparatus. On the other hand, it should be remembered that the formation of the primitive dorsal mesentery also takes place at this time, and, with the growth and differentiation of the dorsal mesentery, displacement into the peritoneal cavity of the epithelial structures of various types, together with the mesentery, may occur. The displacement of bits of ectoderm, which may be carried forward with the genitourinary apparatus, may explain the occurrence of simple dermoids and epithelial cysts in the peritoneal cavity.

Some of these displaced structures may not degenerate, and may later become involved in the origin of some of the primary cystic tumors, of varying histologic structures, subsequently found in the abdominal cavity. This concept of the histogenesis of these abdominal and retroperitoneal masses by Hansmann and Budd[14] is in agreement with the theory of fetal rests offered by Cohnheim.[15]

The same idea of the formation of mesenteric cysts had been suggested by Dowd[16] in 1900. This author contended that the cystic masses were derived from the embryonic rudiments of the pronephros and the mesonephros, with subsequent forward displacement of the cyst between the layers of the mesentery. Although the urogenital origin of these cysts is of interest and may apply to the

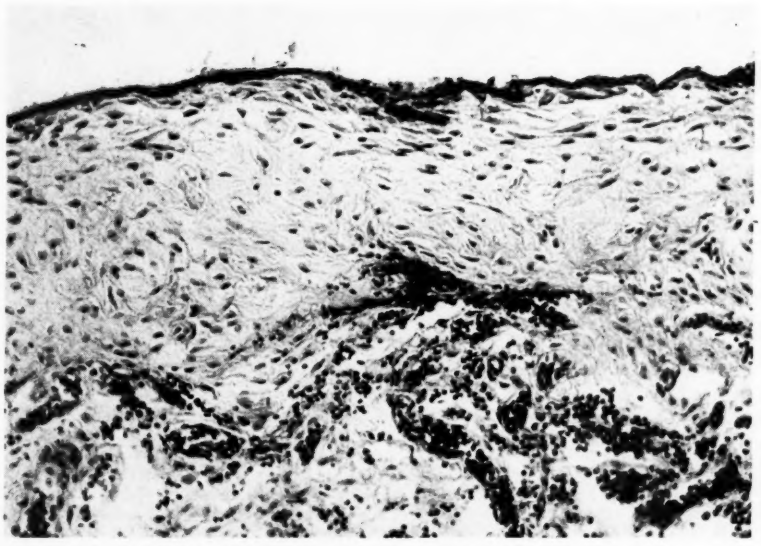

Fig. 3 (*Case 2; patient D.McC.*).—Section (× 240) taken from the cyst wall shows the inner portion to be composed of dense collagenous fibers lined by layers of fibrinoid material. There is no endothelial lining except for small scattered patches. Focal hemorrhages are frequently seen in this cyst wall around many small blood vessels and dilated lymphatics. Accumulations of lymphocytes are present. Deep in the wall, small lymph nodes were found.

many mesenteric and retroperitoneal cysts, direct proof for this hypothesis is yet to be found. Lahey and Eckerson[17] have also stated their conviction that all cysts of congenital or developmental origin are or were originally retroperitoneal.

Other investigators have considered that the formation of the mesenteric cyst of chylous origin could be explained by lymphatic obstruction. Genkin[18] in 1928 reported a case in which a chylous cyst was found surrounded by a surgical swab retained in the abdominal cavity. Lee[6] expressed the opinon that extravasation occurring in the small lymph glands near the root of the mesentery, with subsequent walling off, could be the basis for the formation of such a cyst. He concluded that the lymphatic mesothelium at the site of the rupture is not able to seal off the defect in the lymphatic vessel but actually lines the mouth of the extravasated area and extends partly along the fibrous tissues of the neck of the mass without lining the cyst completely. This author suggested that, on this basis, it can be readily understood why the chylous cyst with a thin wall has a mesothelial lining.

Lee[6] attempted to produce a high degree of obstruction to the lymphatic vessels in dogs, but no cyst could be produced in this manner. In none of our cases was an attempt made to demonstrate a lymphatic connection between chylous cysts and lymph vessels bearing chylous fluid. The presence of chylous fluid in these cysts, however, cannot be explained on any other basis than a direct connection with a lymphatic structure. Dr. Gustav Lindskog[19] has been able to visualize lymphatic structures leading into and from chylangiomas of the thorax by introducing a contrast medium into the lymphatic connections overlying this cyst at operation. Demonstration of the passage of the contrast material in this case not only showed the lymphatic connections but demonstrated collaterals lead-

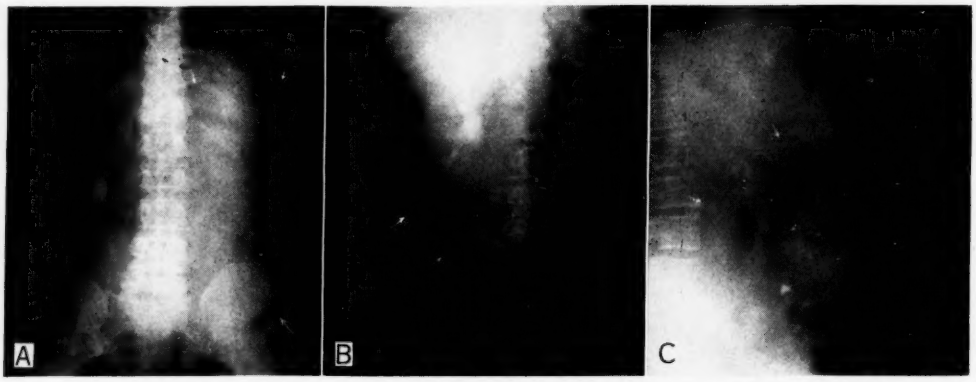

Fig. 4 (*Case 3; patient S.G.*).—*A*, arrows outline the massive homogeneous density, which extends from the point along the superior margin of the ala of the sacrum on the right into the region of the left upper quadrant. *B*, intravenous urogram demonstrates the dye outlining the upper part of the urinary tract bilaterally. The kidney contours were obliterated. *C*, view showing that although the borders of the mass presented a margin of increased translucency, the mass itself was homogeneous. The small triangular density represents previously ingested barium contained in the large bowel. At operation, a large mesenteric chylous cyst was found. The gross specimen measured approximately 28 by 15 cm.

ing into the thoracic duct. Such a procedure should be kept in mind when an abdominal exploration for a cystic mass of unknown origin is contemplated. Guthrie and Warfield[20] have suggested that cysts may arise from small bowel diverticula which extend into the mesentery and are then pinched off. Although some of the diverticula are absorbed, others may remain to form cysts.

Pathologic Picture.—Although mesenteric cysts are somewhat more commonly observed in the mesocolon, single or multiple cystic masses may occur anywhere along the course of the alimentary tract. Such cystic masses have been reported in fetuses, infants and the aged. Warfield,[11] reviewing 129 cases from the literature, showed that in only 14 cases had these masses been demonstrated in the jejunal mesentery.

The mesenteric cyst may vary greatly in size, ranging from a pea-sized bleb-like structure to a cystic mass that may occupy the entire abdomen, extending from the xiphoid to the symphysis. The simplest form of cyst is that which contains chylous, lymphatic or serous contents. This type of cyst usually has a dense fibrous wall in which numerous lymphocytes and lymph follicles may be shown. Occasionally, lymphatic channels are demonstrated. The lining cells of the cysts resemble endothelium similar to that lining the lymphatic vessels. The contents of the cyst may be liquid, semifluid or greasy, depending upon the amount of fat or solid material present. Fatty material or cholesterol crystals about which giant multinucleated cells are clustered may be demonstrated microscopically. In those cysts in which hemorrhage has taken place the contents are often discolored by the escaping blood. Chylangiomas are usually multilocular and occasionally are demonstrated as numerous small swellings involving the mesentery, the intestine, the omentum or the retroperitoneal organs. Of the mesenteric tumors that have been described, the cystic variety is four times as common as the solid.

The cysts are more commonly demonstrated in the mesentery of the ileum and jejunum than in that of the colon. Figures taken from a paper by Slocum[8] compare the fluids analyzed by several investigators and give the results of these analyses for chylous effusion and chylous cyst. Enteric cysts or enterocystomas, according to Warfield,[11] have an epithelial

lining of the intestinal type, whereas chylangiomas have an endothelial lining. The enteric cysts are more regularly identified. This type of cyst occurs most commonly in the ileum, near the omphalomesenteric duct. Not infrequently the cells lining the cysts resemble the secreting epithelial cells of the gastrointestinal tract. The wall may in some instances contain smooth muscle and lymphoid tissue. In other cases a fibrous wall may be demonstrated in the cyst. Beahrs, Judd and Dockerty[9] expressed the opinion that masses containing a well defined cyst wall and smooth muscle are of congenital or developmental origin. In cases in which smooth muscles are absent, these investigators considered the cyst to be of acquired origin.

On the other hand, according to Block,[21] the chief confusion in differentiation exists between a true chylangioma and an enterocystoma due to cystic dilatation or congenital duplication of the bowel. The duplication cyst is a thick-walled structure that contains all of the intestinal layers in its walls. This structure is usually situated immediately adjacent to the bowel, between the folds of the mesentery. The musculature of the duplication cyst is intimately associated with that of intestine, so that occasionally the enterogenous cyst cannot be removed without destruction of the intestinal blood supply.

According to Block,[21] the true mesenteric cyst is a thin-walled structure and has no muscular coat or mucosal lining. Though it may lie against the mesenteric surface of the intestine, a line of cleavage may exist between the two, so that the mass can often be excised without any injury to the blood supply or the bowel wall. Controversy exists even concerning the existence and the significance of the presence of muscle in the cyst wall.

Often, histologic study will aid in evaluating and classifying the cystic masses that are encountered in the abdomen. Many times the effects of high intracystic pressure, hemorrhage, necrosis and infection so modify the lining cells as to make identification impossible. In such cases even the pathologist will find it impossible to classify a specimen satisfactorily.

Clinical Aspects.—Although in many cases the cysts remain so small as to be completely asymptomatic, in other cases symptoms may occur as a result of traction of the mass or compression or torsion with impairment of the intestinal blood supply. Acute intestinal obstruction may develop because of the presence of these cystic masses; this was present in approximately 30 to 50 per cent of the recorded cases. Less common complications are hemorrhage or rupture of the cystic mass. Thompson and Chambers[22] have stated that other complications include peritonitis secondary to obstruction, rupture, hemorrhage into the cyst with rupture of the cyst spontaneously or following trauma. Incarceration of the cyst in the pelvis may also occur. In cases in which complications develop there is little time for delay and an accurate diagnosis is rarely made prior to operation. In most cases the symptoms of mesenteric cyst are rarely pathognomonic, and it is seldom that diagnosis of a mesenteric cyst is made preoperatively. Cases in which preoperative diagnoses have been made are reported by various authors. However, in most cases, it is impossible to distinguish the types of cyst except on pathologic examination. Often it is even impossible after histologic study.

Most frequently, the presenting symptoms are those of an acute surgical complication resembling intestinal obstruction occurring as a result of volvulus, angulation of the bowel, adhesions, intussusception, stenosis of the bowel or rupture. The presenting symptoms most often resemble those of cystic pressure on the various organs that lie in relation to the cyst. If the condition is acute, the symptoms will resemble those of peritonitis, hemorrhage, rupture of a cyst, torsion or incarceration of a bowel loop. In cases in which the patient presents himself without evidence of an associated acute episode, he may occasionally complain of abdominal distention. The pain may be

generalized or localized, and often the patient will complain of localized tenderness in the region of the cystic mass. Frequent complaints are malaise, anorexia, nausea, vomiting, fatigue and loss of weight and strength. The difficulty of diagnosis has been pointed out by Swartley,[23] who stated that a correct preoperative antemortem diagnosis of mesenteric cyst has rarely been recorded. Obviously, the clinical diagnosis is rendered difficult, and impossible in many cases, because the symptoms are nonspecific. It is possible, however, to point out that the physical examination usually demonstrates a palpable tumor. A zone of resonance around, or a belt of resonance across, the cystic mass has been reported by several authorities. This zone was not encountered in our group of cases. This zone of resonance is apparently due to displacement of the bowel loops that lie in relation to the cystic mass.

Roentgen Diagnosis.—The differentiation of mesenteric cyst from other abdominal masses depends mainly on exclusion. In most cases, if the radiologist is permitted to utilize the various roentgenographic procedures and a complete study is performed, a mesenteric cyst does not present the difficult problems indicated by some surgeons. In order to evaluate an unexplained abdominal mass, consideration must be given to tumors of ovarian, uterine, intestinal or renal origin. Primary retroperitoneal tumors must be included in this differential diagnosis. The retroperitoneal lesions that must be excluded from the primary intra-abdominal mesenteric cysts are those of renal origin, including hydronephrosis, polycystic kidney, solitary cyst of the kidney, renal neoplasm and perinephritic abscess. The tumors of intra-abdominal origin which must be evaluated are tumor of the gastrointestinal tract, cyst of the spleen, enlargement of the spleen, pancreatic cyst, ovarian tumor, neoplasm of the liver and urachal cyst.

In most of the reported cases no roentgenographic studies have been completed. As Hinkle[24] pointed out, in the few reported cases in which roentgen studies have been done, the results have been considered inadequate and most observers have concluded that the studies did contribute little to the diagnosis.

Roentgen studies of the gastrointestinal tract and intravenous and retrograde pyelographic studies of the urinary tract will greatly aid in the differentiation and exclusion of numerous masses contained in the abdomen. It is of tremendous importance to determine, first, whether the mass under consideration is situated in the retroperitoneal area or in the intra-abdominal cavity. Urologic studies will greatly aid in the majority of cases, since the position of the ureters can be adequately determined by this means. These studies are based on the anatomic fact that the ureters are quite adherent to the posterior parietal wall, so that displacement of the ureters anteriorly is necessarily caused by retroperitoneal masses. Renal dystopia caused by intra-abdominal masses does occur. However, an intra-abdominal mass rarely produces displacement of the calyces or the renal pelvis. Occasionally an intra-abdominal mass produces displacement of the bladder dome.

Weyrauch[25] has pointed out that it is impossible to localize the mass of the peritoneal cavity or the retroperitoneal area on the basis of the type of renal torsion demonstrated. In general, it is believed that a mass projecting against the central area of the kidney is more apt to cause vertical torsion, while one pushing at either pole is more apt to produce transverse or horizontal torsion. It is of importance to undertake urographic studies especially, so that the peripheral margins of the kidney may be adequately shown and differentiation thus made from cystic masses associated with the urinary tract. In our group of cases gross displacement of the kidneys was not demonstrated.

The exclusion of the gastrointestinal tract as the primary site of the tumor is the chief value of roentgen studies of the alimentary tract. Frequently the tumor

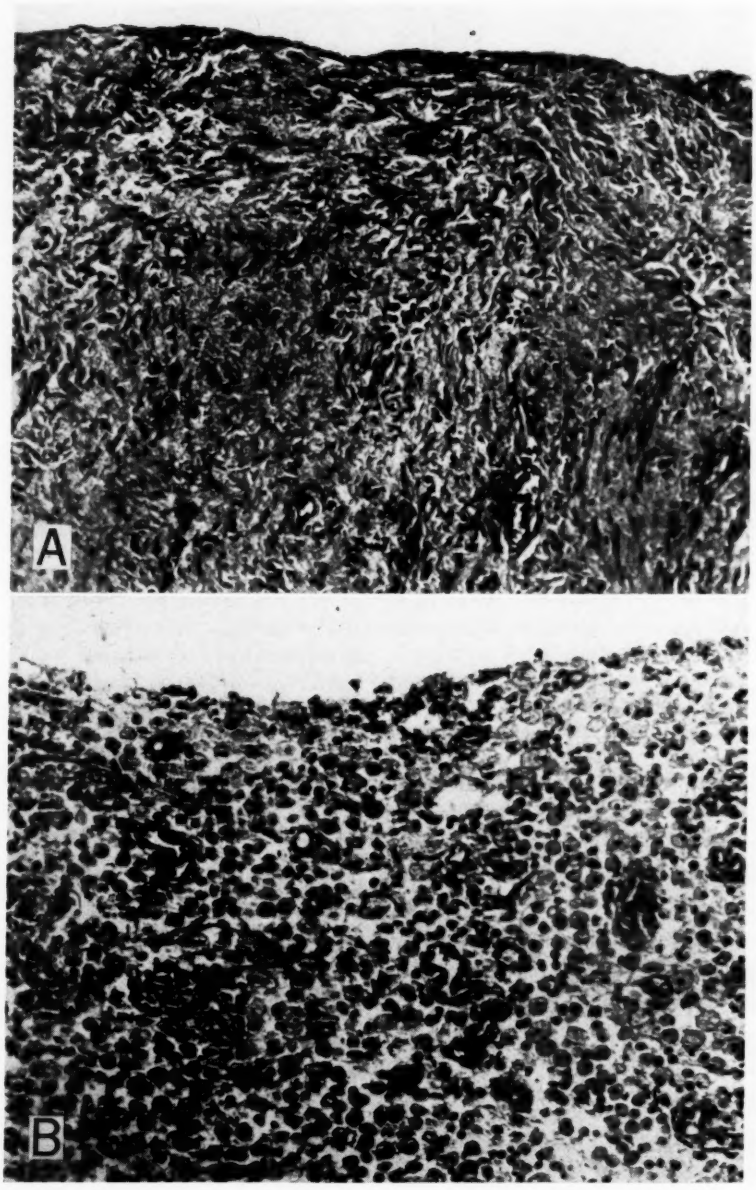

Fig. 5 (*Case 3; patient S.G.*)—*A*, wall of the cyst (×230), composed of dense collagenous tissues in which there are many blood vessels and dilated lymph channels. There is intense suppurative chronic inflammatory necrosis. Much fat necrosis is present in the surrounding mesenteric fat. Most of the lining of the cyst wall had disappeared and is replaced by a thin layer of fibrin in which there are many lipid-filled phagocytes. *B*, photomicrograph (× 230) demonstrating the same microscopic features. Note that the epithelial lining of the cyst is almost completely absent.

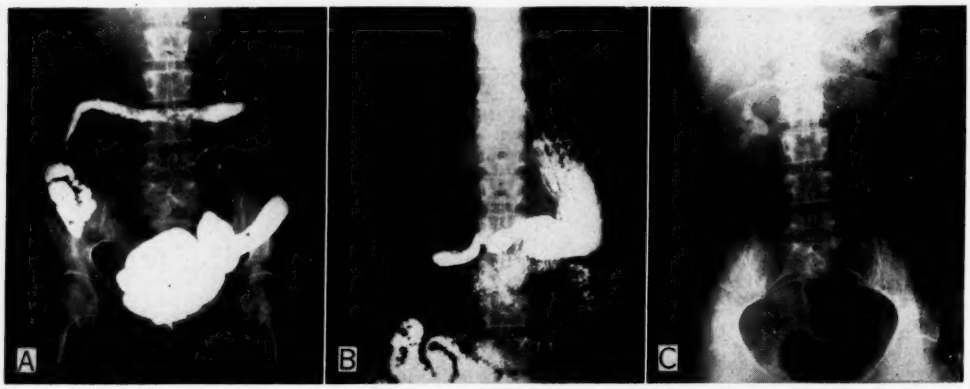

Fig. 6 (*Case 4; patient M.C.*).—Roentgenograms demonstrating extensive nonspecific ulcerative colitis. In *A*, note reduction of the caliber of the lumen with loss of the characteristic haustra and shortening of the bowel with loss of the normal flexures. The white arrow outlines the site of the chylous cyst. *B*, study of the upper part of the gastrointestinal tract, demonstrating the pressure defect produced by the chylous mesenteric cyst mass along the margins of the small bowel. Note arrows. Note how the cyst has displaced the small bowel loops in the region of the jejunum upward. The white arrow demonstrates the inferior margin of the cyst. *C*, cyst outlined by arrows. At autopsy, minute calcium deposits could be demonstrated in the cyst wall. The chylous mesenteric cyst displaced the ureter mesially.

produces displacement of loops of small bowel, as is demonstrated by several of the reported cases. In most instances, a modified study of the small bowel will give adequate information and determine whether a more detailed study is necessary. Such a study may be made by utilizing a fifteen-minute film followed by one-hour, three-hour and five-hour studies. Survey films of the small bowel will aid in evaluating the appearance of the intestine and in determining whether changes in the mucosal pattern and contour of the bowel are present.

Recently, Bersack and his co-workers[26] have described the roentgen appearance of masses involving the wall of the small intestine and the adjacent mesentery. Roentgenographically these authors showed that mesenteric masses closely approximating the bowel wall may produce the following defects: 1. Elongation and compression of the small intestine. 2. Fusiform ribbon-like thinning of the intestinal wall. 3. Oval dilatation with eccentric (but centrally projected) channel formation. 4. Relative radiolucency of the mass. Similar appearances could also be presented by mesenteric cysts closely approximated to the bowel wall.

If the tumor is of sufficient size, displacement of segments of the large bowel from the normal position may be found. In some cases the tumor will be outlined by the displaced intestinal loops. The single abdominal film in the frontal and lateral positions is considered of the greatest assistance in determining the position of such masses. It is often wise to take films in the posteroanterior as well as in the anteroposterior position. Most observers who have recorded cases of abdominal cystic masses have stated that the masses demonstrated in the flat film have the same density as the kidney. In only 1 of our cases could calcifications be demonstrated, and subsequent microscopic studies confirmed this impression. Calicifications in mesenteric chylangiomas have been reported rarely. These masses are characterized on the flat film by a rounded or ovoid contour of diminished density. Often the mass is sharply delineated from surrounding soft tissue by a thin line of increased density. Moreover, repeated examinations of the same region

will always demonstrate a similar picture. The constancy of the lesion, both in the flat film and after barium contrast studies of the bowel, constitutes confirmatory evidence.

If a mesenteric lipoma is suspected, the characteristic radiolucency of this mass compared to the surrounding soft tissues will aid significantly in distinguishing this structure from other solid tumors. Since a retroperitoneal mass may occasionally present roentgen features simulating an intra-abdominal tumor, it is necessary that such masses be considered also in the differential diagnosis.

It is obvious that if such masses are present in the pelvis, it would be extraordinarily difficult to differentiate them satisfactorily, since dermoid cysts in the ovary in the absence of calcification would present similar features. Thus, we encountered 2 cases in which a clinical diagnosis of ovarian cyst had been made. Pelvic dermoids, however, frequently contain bone, cartilage or teeth, and these will aid substantially in the differential diagnosis.

Attempts to demonstrate these cysts after pneumoperitoneum have also been made. Golden[27] pointed out that cystic masses cast shadows of soft tissue density, in which no gas can be seen and which often displace the small intestine. In our group of cases no attempt was made to utilize pneumoperitoneum or peritoneoscopic investigation. We have considered that surgical intervention offered the more definitive approach.

Surgical Aspects.—The etiologic factors and the classifications of mesenteric chylous masses are largely matters of academic interest, since treatment in most cases is identical. Exploration is strongly indicated in every instance of a palpable mass in the upper part of the abdomen. Thus, although it is readily admitted that a mesenteric cyst in itself has little pathologic significance, it is important that this cystic mass be differentiated from a large number of significant space-occupying lesions. Moreover, the tenderness present and the shape of the mass should not be relied on in differentiating between benign and malignant masses. Although in our series the lesions were benign, others have reported the occurrence of malignant lesions in association with mesenteric cystic masses. Temporization in the presence of a large or moderate-sized mass may allow spontaneous or traumatic rupture to occur. Total excision of the mass whenever its size and the surrounding structures permit such an undertaking is apparently the ideal procedure.

The attendant difficulties and the necessity of removing bowel segments of varying size are amply demonstrated in the following illustrative cases. External drainage or marsupialization offers the advantages of single performance and a low mortality rate, but these procedures may entail prolonged drainage, varying degrees of cutaneous excoriation and the possibility of recurrence of the cyst.

Internal drainage of the cyst may be possible, but there is no recorded case of the use of this procedure with a mesenteric chylous cyst. Others have utilized enucleation, drainage and simple aspiration. Enucleation has been the type of surgical treatment most frequently used and has provided the lowest mortality rate—9 per cent, according to Roller.[10]

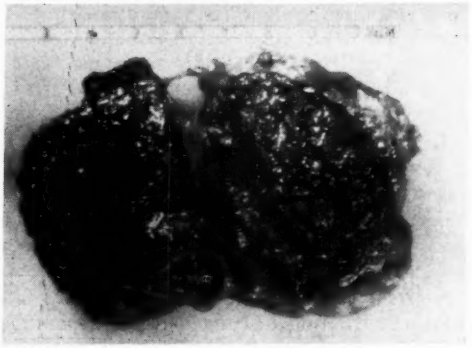

Fig. 7 (*Case 4; patient M.C.*).—Gross specimen observed at autopsy in Case 4, approximately 7 cm. in diameter and filled with thick cheesy material. Dilated enlarged lymphatics entering into the base of the cyst were also noted at autopsy.

With resection of the adjacent intestine, the mortality rate is increased, according to this author, to approximately 25 to 30 per cent. The prognosis is determined by the location and size of the cyst, the sites of attachment, the operative procedure employed and the benignancy or malignancy of the mass. The age and general condition of the patient are significant. Although Warfield[11] reported immediate death in 20 per cent of his group of cases, no deaths attributable to surgical intervention were encountered in the group of cases aforementioned. Autopsy was performed on 1 patient who died of fulminating ulcerative colitis. This patient was not operated on.

The following selected group of cases is presented in order to illustrate some of the diagnostic, surgical and postoperative problems encountered with mesenteric cysts. The data on 7 cases from the total group of 11 are presented in moderate detail.

REPORT OF CASES

CASE 1.—S. H., a boy aged 16, was admitted to the hospital on April 11, 1936, because of persistent abdominal pain. He had first noted attacks of pain in the region of the epigastrium three months earlier. Occasionally, the pain was periumbilical or would extend to the precardium. Despite the fact that the patient's appetite had been good, he had lost 20 pounds (9.1 Kg.) since the onset of the illness. The pain had not been associated with nausea or vomiting.

Examination of the abdomen demonstrated no evidence of tenderness, spasm, masses or enlargement of the liver or spleen.

The preliminary studies completed on this patient were performed in the outpatient department of Mount Sinai Hospital in New York City. The outpatient departmental records and the roentgen studies had been destroyed and were no longer available for review. It is noted, however, that a flat film showed a well defined ovoid mass, apparently in the right lower quadrant of the abdomen. Studies of the small bowel demonstrated displacement of some of the ileal loops in the region of the right lower quadrant. In addition, a rounded mass produced some compression and elongation of the bowel wall, with narrowing of the intestinal lumen. The preoperative roentgen diagnosis, made by Dr. Marcy Sussman, was that of a cyst of the mesentery or of the omentum.

Laparotomy disclosed a cystic tumor contained in the pelvis, approximately the size of a large grapefruit. This was situated in the mesentery adjacent to the bowel wall, producing displacement of the distal ileal bowel loops. Further exploration revealed several dozen smaller cysts throughout the mesentery in this region, as well as two larger cysts, one of which was the size of a navel orange (Fig. 1). The smaller cysts were removed without difficulty, but, because of the position of the larger cysts in relationship to the bowel wall, resection of a portion of the intestine in this area was considered necessary. This was completed, and a primary end-to-end anastomosis was performed in this region. Recovery was uneventful, and subsequent examinations revealed nothing significant.

Examination of the gross specimen revealed a segment of smooth, somewhat congested small intestine approximately 45 cm. in length and 2.5 cm. in diameter. Multiple cysts filled with a slightly blood-tinged milky fluid were attached to the mesentery. In addition, the two larger cysts aforedescribed were present. The larger of these two cysts measured approximately 12 cm. in diameter; the smaller, approximately 7 cm. Enlarged lacteals could be demonstrated in the base of the mesentery.

CASE 2.—D. McC., a 37-year-old white woman, entered a hospital in May 1944 with pain in the right upper abdominal quadrant, of several days' duration, and a leukocyte count of 17,600 per cubic millimeter of blood. At operation a normal appendix was removed. An enlarged ovary with a corpus luteum hemorrhagic cyst was removed, together with the right tube, which proved to be inflamed. The remainder of the abdomen was not explored.

Several days after the operation the patient complained of pain in the left lower quadrant and the lateral aspect of the abdomen, and a mass was said to have developed in this area. At a subsequent operative procedure a mesenteric cyst the size of a small football was found and drained. The patient ran a moderately stormy postoperative course, during which there developed an impetiginous infection of the lower part of the

Fig. 8 (*Case 5; patient H.F.*).—Photomicrograph (× 150) showing the cyst wall to be thin and composed of a thick layer of collagenous fibers, covered in places by flattened endothelial cells, which lie in relation to the lumen of the cyst. Deep in the wall were numerous blood vessels surrounded by a scattering of lymphocytes, dilated lymphatics and in places small nodules of lymphoid tissue.

abdomen and the vulva. Four days after her discharge on June 24, 1944, the patient had crampy abdominal pain and an elevated temperature. Because of persistent drainage of chylous material from the wound and a bacterial culture that gave positive results for Staphylococcus aureus, she was transferred to New Haven for additional therapy. The flat film and intravenous urographic studies demonstrated a large homogeneous area of increased density that occupied the left half of the abdomen and extended from the level of the superior margin of the twelfth dorsal vertebra to the level of the inferior margin of the fifth lumbar vertebral segment (Fig. 2, *A* and *B*). The superior and inferior margins were outlined by a sharply defined margin of increased translucency. There was no gross distortion of the psoas margins. The margins of the left kidney could be adequately defined. The arrows in the illustration delineate the inferior and superior margins of the cyst. All of the bowel loops were displaced by the large cystic mass. The oblique studies of the urinary tract demonstrated a minimal degree of posterior displacement of the proximal portion of the upper ureter on the left side. One of us (A. J. M.) resected the mesenteric cyst. In order to complete removal of the mass it was necessary to resect a considerable segment of the small bowel (30 cm.). The cyst appeared to arise in the region of the leaves of the mesentery of the jejunum. It extended into and displaced portions of the mesentery which was attached to the proximal segments of the ileum.

A gray-surfaced cyst measuring approximately 20 by 8 cm. was removed. Enormous dilated lacteals entering into the base of the cyst were noted at operation. The cyst wall varied from 1 to 3 mm. in thickness (Fig. 3). Sections showed the inner portion of the cyst wall to be composed of dense collagenous fibers lined by layers of fibrinoid material. Except for small scattered patches, there was no definite endothelial lining. Numerous small focal hemorrhages were seen in the cyst wall surrounding many blood vessels and dilated lymphatics. There were many ac-

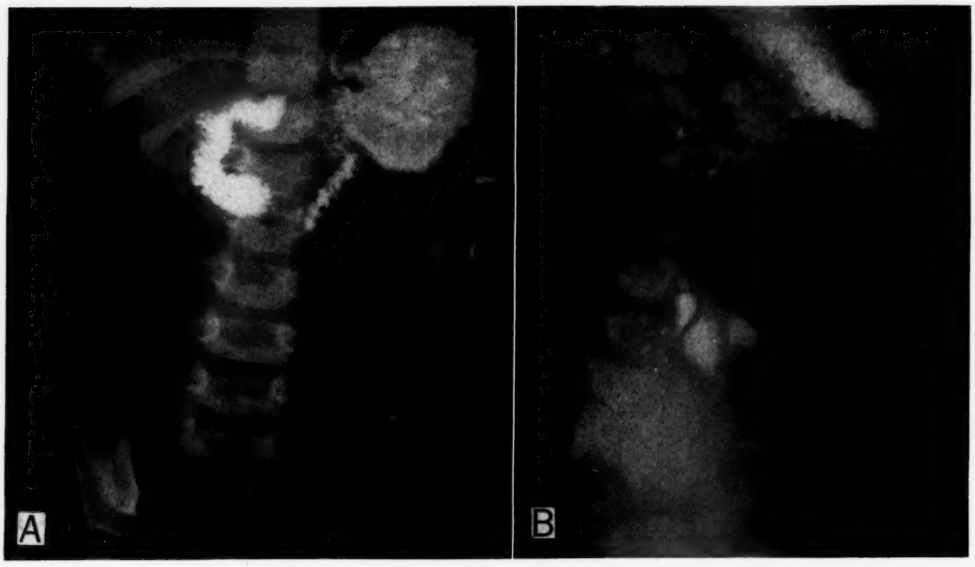

Fig. 9 (*Case 6; patient W.T.*)—Lateral and anterior views taken in Case 6. The mass is not adequately demonstrated in the anteroposterior view taken after the ingestion of barium. In the lateral view the rounded mass displaces the bowel loop anteriorly and produces some elevation of the body of the stomach. In addition, the third portion of the duodenum is elevated. The large cystic mass contained in the midabdomen was removed at operation.

cumulations of lymphocytes, and deep in the cyst wall several small lymph nodes were observed. Some of the cyst contents were stained with Scharlach red, and many fat droplets were observed. Chemical analysis of the material was completed, and the neutral fat found in the contents was 54 per cent of the total solids. Despite the content of neutral fat, the density of the shadow was slightly less than that of the kidney.

After resection of the small bowel and removal of the enormous mesenteric cyst, the patient made a satisfactory recovery but continued to have vague abdominal discomfort. She was discharged from the hospital in relatively good condition. Her interim study from the time of discharge to her admission on Oct. 17, 1945, was not characterized by any extraordinary incidents, although she stated that she had not gained any weight during this period. She was readmitted for study on October 17, with clinical evidence of obstruction of the right ureter. On exploration, the ureter was bound down in a mass, which at the time of operation was thought to be of neoplastic origin. The right ureter was ligated because the investigating surgeon thought that he was dealing with an extensive neoplastic lesion. Subsequent studies of the biopsy specimen taken at this operation, however, indicated that the mass was of inflammatory origin.

After this operative procedure, there developed severe persistent diarrhea associated with crampy abdominal pain. The patient was thought to have an ileocolic fistula, but further studies at the New Haven Unit did not corroborate this diagnosis. After a course of sulfasuxadine, antispasmodics, intramuscular liver, a high protein residue diet and kaopectate, she improved remarkably and since January 1946 has been quite well.

CASE 3.—S. G., a 56-year-old white woman, was first seen on Oct. 28, 1947, complaining of abdominal pain of two weeks' duration. She stated that she had always been in good health until two weeks prior to this visit, when she noticed a dull constant pain in the upper part of the abdomen. The pain did not radiate. It was always associated with nausea, and on one occasion the patient forced herself to vomit. Her appetite, however, had remained good despite her illness.

Physical examination revealed the patient to be well developed and in no acute distress. A large, hard, moderately tender, nonmovable mass extending from the epigastrium over to the left midclavicular line was present. The lower border of the mass was indefinite.

The first roentgen studies, performed on October 29, demonstrated a large, soft tissue mass which contained in the region of the left midquadrant. It showed no evidences of calcification. Although the kidney margins could not be satisfactorily delineated, the psoas margins were adequately outlined. An intravenous urographic study completed on October 31 again demonstrated the large soft tissue density in the left upper quadrant, with satisfactory visualization of both kidney shadows (Fig. 4, *A* and *B*). A small triangular density seen in the illustration is due to retained barium contained in the large bowel (Fig. 4*C*). Gross displacement of the kidneys could not be shown, and there was no evidence of distortion or displacement of the ureters of any significant degree. In the opinion of the investigating surgeon the mass was not of retroperitoneal origin.

On November 3, after an abdominal laparotomy, a massive mesenteric cyst arising in relation to the mid-transverse colon was demonstrated. In order to remove the cyst completely, it was necessary to remove a small section of the transverse colon, which was done without difficulty.

Examination of the gross specimen showed a massive, thick-walled cyst measuring approximately 28 by 15 cm. and containing large amounts of murky greenish yellow fluid. The cyst had apparently distended the entire abdomen and extended into the root of the mesentery near the site of the attachment to the transverse colon. Microscopically, the wall of the cyst was composed of dense collagenous tissue in which there were numerous blood vessels and many dilated lymphatic vessels (Fig. 5*A*). Intense suppuration and necrotic inflammatory reaction were present, with focal areas of necrosis. Much fat necrosis was also observed in the surrounding mesenteric fat. Most of the lining of the cyst wall was destroyed and had been replaced by a thin wall of fibrin in which there were many lipid-filled phagocytes.

CASE 4.—M. C., a 48-year -old white woman, was first seen at the Grace Unit on March 25, 1949, because of persistent loss in weight. The patient was known to have been hypertensive for the past eleven years, this condition having followed toxemia of pregnancy.

Fig. 10 (*Case 7; patient L.R.*)—*A*, the rounded area of increased density overlies the inferior pole of the right kidney. It does not produce obliteration of the kidney margins, and there is no evidence of renal displacement. *B*, examination after following a barium meal demonstrates the displaced small bowel loops. The barium-filled loops outline the margins of the cystic mass. A barium enema study also demonstrated that the mass produced extrinsic pressure upon the mesial margins of the ascending colon and splenic flexure.

She had been maintained on a low salt diet and bed rest. In 1946 she had been treated at the New Haven Unit because of a subarachnoid hemorrhage. She had been admitted to hospitals on numerous occasions because of extensive and severe ulcerative colitis. A mesenteric cyst approximately the size of a large orange, containing numerous small, poorly defined areas of calcification, was first described as contained in the region of the left midquadrant in the preliminary intravenous pyelogram studies completed at the Grace Unit (Fig. 6; Fig. 7, *B* and *C*). Although the mass had been described in 1946, because of the subsequent history of the patient no attempt at removal of the mass was entertained. The patient was readmitted to another hospital because of extensive fulminating enterocolitis, hypoproteinemia, cirrhosis of the liver, generalized weakness, debility and marked weight loss. She died in 1950, and at autopsy the mesenteric chylous cyst was discovered (Fig. 7). The mass was contained in the mesentery of the jejunum and measured approximately 7 cm. in diameter. It was encapsulated in a thick, white semitranslucent capsule and one section was filled with shiny golden crystalline material.

CASE 5.—H. F., a boy aged 16 months, was admitted to the New Haven Unit on Nov. 2, 1949, for vomiting and abdominal pain of sixty hours' duration. He became dehydrated and continued to vomit immediately after eating, the vomitus gushing forth with great force. The child became exhausted and weak after these episodes. There had been no spontaneous bowel movements in the two days before admission, but the child did pass gas rectally. The abdomen had been distended. The child had had similar episodes in the past since the age of 6 or 7 months. These episodes occurred every few months, the most recent one having occurred three months before admission. The child pulled his legs up as if in pain and was not relieved by massage, pressure or change in position. He was hospitalized elsewhere for ten days. The upper gastrointestinal series was not considered diagnostic. The child was released with a diagnosis of cyclic vomiting.

Physical examination demonstrated the baby to be well developed and well nourished, but thin and large for his age. He was lethargic and uncooperative. He appeared acutely ill, but only moderately distressed. The abdomen was sunken. There was no spasm or rigidity. A lemon-sized mass was present, first palpated in the right lower quadrant and easily movable. Subsequently the mass could be felt to the left of the rectus muscle. It was tender and soft.

On November 10 an exploratory laparotomy was performed. The malrotation of the colon demonstrated that the cecum lay in the left upper quadrant, but the cecum lay free and was not bound down by any adhesions. The mesentery was quite tight, and a mass was felt in this area and was delivered after the volvulus of the mesentery had been reduced. This mass consisted of two white cystic masses in the mesentery, filled with what was apparently keratotic débris. The larger mass measured about 4 cm. in diameter and the smaller about 2 cm. A number of smaller cysts were present around these two large ones. The two larger cysts contained yellow fluid. The cystic areas were removed from the mesentery without damage to the blood supply of the bowel, and the mesentery was repaired.

Examination of the cystic material removed at operation showed a slitlike structure shaped like a dumbbell. One portion of the dumbbell, however, was considerably larger than the other. The larger portion measured 4 by 3.8 by 2.5 cm. Just above this larger area, there was a portion measuring 1.4 cm. in diameter and about 3 mm. long. The other portion of the dumbbell, which was collapsed, measured 1.8 by 2 by 0.5 cm. The larger portion was smooth, tense and apparently filled with fluid. The smaller portion contained a small amount of fluid but was not distended. At the region of the thickening there were three firm nodules measuring from 0.5 to 1 cm. in diameter. These were yellowish and were intimately attached to the wall of the cyst. The cyst wall was gray-white and somewhat injected. The outer layer of the wall of the cyst appeared to extend in continuity over these three previously described nodules. When the distal ends were opened, yellow-white material was observed. There was a fine membrane separating the nodules. The three previously described nodules on section were yellowish white. They cut with a gritty sensation and were quite firm. Representative portions of these as well as of the cyst wall were sent for microscopic examination (Fig. 8). The cyst wall measured about 1 mm. in diameter, and the surface was yellow-white, smooth and glistening. The sections above showed that the epithelial lining of the cyst was com-

Fig. 11 (*Case of D.M.*).—Film made at the end of fifteen minutes, demonstrating the displaced small bowel loops. The proximal jejunum is displaced upward by the well-defined mass. The arrows outline the lateral margins of the chylous mesenteric cyst which was found in this patient, a woman 37 years old. *B*, arrow shows the posposterior displacement of the left ureter by the deeply seated mesenteric cyst.

pletely absent (Fig. 5, *A* and *B*). Lying beneath the epithelial lining was what was presumably a fibrous mass of tissue and more externally a band of smooth muscle fibers. There was no other remarkable microscopic pathologic change. The patient was discharged from the hospital on December 10.

CASE 6.—W. T., a 5-year-old white boy, was admitted to another hospital on Oct. 23, 1950, with a twelve-day history of pain in the stomach associated with vomiting of all foods for the previous two days. No spontaneous bowel movements had occurred for four or five days prior to admission. The pain in the stomach was described as a constant dull ache, increasing in intensity about every fifteen or twenty minutes and not relieved by paregoric. There was no elevation of temperature.

Physical examination revealed the child to be well developed but pale. He showed evidence of loss of weight, and the abdomen appeared slightly distended though without palpably enlarged viscera.

Because the child presented symptoms suggestive of an intermittent obstruction, a gastrointestinal roentgen series was done. This revealed anterior displacement of the transverse colon and the small bowel. There was also evidence of extrinsic pressure on the third part of the duodenum (Fig. 9, *A* and *B*). The child was operated on and a large (23 by 36 cm.) cystic whitish mass was observed in the mesentery of the small bowel. The mass contained thin yellowish fluid.

The cystic mass was excised, and it was noted that a portion of small bowel was devitalized. This segment of bowel was resected and an end-to-end anastomosis was done. The child did well immediately after the operation, but on the sixth postoperative day he complained of pain in the abdomen over the operative site. Examination revealed crepitation on the lateral aspect of the wound, extending into the flank. The lower angle of the wound was opened, and dark, frothy blood was presented. After evacuation of the blood from the wound, the recovery of the patient was uneventful.

Since then, the child has been treated with

Fig. 12.—Section (× 150) from the mesenteric cyst wall shows it to be composed of connective tissue with blood vessels and lymphatic accumulations. There is evidence of chronic inflammatory exudate. No epithelium lining of the cyst could be shown.

antibiotics and has responded well. When discharged he had not fully recovered, but showed some loss in weight and complained of ache in the abdomen. When examined in January 1952, he was symptom-free.

CASE 7.—L. R., a white woman aged 72, was first admitted to the surgical service of The Grace-New Haven Community Hospital, the New Haven Unit, on Jan. 8, 1951, with a chief complaint of constipation of many years' duration. No associated rectal bleeding or melena had been encountered. After a very severe bout of constipation, the patient was admitted to the hospital for a survey. The admitting physician had noted an irregular mass in the region of the right upper quadrant and had recommended investigation.

Physical examination revealed the pathologic change confined to the region of the right upper abdominal quadrant, demonstrating a rather hard nodular mass in this area measuring approximately 12 cm. in diameter. This mass could be fixed by the hand grasping the flank above the mass on inspiration. Although anterior outline of the mass could be demonstrated adequately, the posterior margin could not be defined. Although the mass was somewhat mobile, it was not tender.

Roentgen studies demonstrated that the mass was exerting extrinsic pressure on the mesial aspect of the hepatic flexure in the region of the right kidney. Intravenous pyelographic studies demonstrated a normal right kidney with a sharply defined inferior margin, the rounded area of increased density being situated anteriorly and laterally to the renal margins (Fig. 10*A*). Studies of the upper part of the gastrointestinal tract demonstrated that the rounded intra-abdominal soft tissue mass was producing some displacement of the loops of small bowel overlying the costoiliac angle.

Surgical exploration on January 26 demonstrated the mass in the region of the right midquadrant, presenting in the region of the mesial aspect of the colon adjacent to the hepatic flexure (Fig. 10*B*). This was incised and the mass removed after evacuation of its contents.

The cyst measured approximately 8 cm. in diameter. Numerous thin-walled vessels were contained in its wall. A definite mass of solid tissue was not shown in the specimen. Microscopic studies of the wall showed fibrous tissue strands without evidence of inflammatory reaction.

Convalescence was uneventful, and the patient was discharged on February 4.

Statistical Summary. — The observations in 8 cases of chylous mesenteric cyst and 3 cases of mesenteric cyst are here summarized. Three of the 11 patients with mesenteric cysts were male. The ages of these patients were 16 months, five years and 16 years respectively. No definite age predilection was noted, since each decade was represented in the series.

Age	No. of Patients
1-10	2 (male)
11-20	1 (male)
21-30	2
31-40	2
41-50	1
51-60	1
61-80	1

In 2 cases the cystic masses were first detected at pelvic examination. They simulated the clinical picture of ovarian cyst (Cases 10 and 11). In 1 case the poorly calcified cystic mass had been discovered after numerous studies of the large bowel had been carried out because of marked ulcerative colitis. The presence of the mass was subsequently verified at autopsy. In none of the aforementioned 3 cases was the presence of a mass noted by abdominal palpation. In 4 of the 11 cases the patient had a palpable abdominal mass. The operability among this group of patients was not influenced by the palpability or the size of the mass, since exploration was done in each case. Moreover, the type of operative procedure was also not influenced by the size of the mass, since in 6 of the 11 cases removal of varying segments of bowel was required. Two of the resections were performed in the group in which no abdominal mass was palpated.

In addition, the size of the mass gave no indication of its histologic character. It was noted that palpation of the tumor could be accomplished more satisfactorily in female patients and patients in the older age groups, probably because of the thinness and relaxation of the abdominal wall in the female, especially the elderly female. The difficulty of identification of masses in the straining or crying infant or child is well known to most observers.

Various symptoms were recorded; the majority were gastrointestinal. Thus, 1 patient presented herself with a history of prolonged constipation, and because of the presence of a palpable mass in the region of the hepatic flexure the clinical diagnosis was carcinoma of the large bowel. The symptoms noted in the various patients were as follows: abdominal pain, 3; periumbilical pain, 1; loss of weight, 3; pain in the right upper abdominal quadrant, 1; nausea and vomiting, 4; anorexia, 2, and bloating and distention, 2. Combinations of the aforementioned symptoms were noted in several instances. Intestinal symptoms were as common in the patients with a palpable mass as in the group that did not have one.

Six of the 11 patients had had symptoms for six months or less. Those who presented the largest masses stated that they had experienced no discomfort until two to four weeks before the operation. It was our impression that the presence of long-standing symptoms did not favor the development of a palpable mass. It was noteworthy, however, that tenderness could be more commonly elicited on palpation when a larger mass was present.

The preoperative clinical diagnosis prior to roentgen studies ranged among the following conditions: ovarian cyst, ascites, retroperitoneal tumor, pancreatic cyst, renal cyst or mass, carcinoma of the large bowel, intermittent obstruction and mesenteric cyst. In 1 case the diagnosis of chylous mesenteric cyst was made after an operative procedure. Here, the persistent drainage of chyloform fluid following marsupialization also made it possible to obtain chemical analysis of the fluid. Although roentgen studies were done in this case, they did not significantly aid in the diagnosis.

In 9 of the 11 cases roentgen studies were done. Studies of the gastrointestinal tract and urological studies were done in 4 cases. Studies of the large and small bowel were done in 7 cases, and the presence of the mass displacing the bowel loops was demonstrated in 5 cases. In 1 case studies of the upper part of the gastrointestinal tract were considered to

have given negative results, although malrotation of the cecum in association with a cystic mesenteric mass involving the mesentery of the cecum was subsequently observed at operation.

Excretory urographic study was utilized in 5 cases. Although these studies tended to exclude the urinary tract as the site of origin of the mass, displacement of the ureter was observed in only 2 cases despite the large size of the masses (Fig. 11*B*). In none of these cases was there associated hematuria.

Excision of the cyst was performed in 6 cases, together with resection of varying portions of the adjacent bowel. The size of the cyst and its position in a measure determined the amount of bowel resected. In the cases in which removal of the mass impaired the blood supply or the wall of the bowel, these segments were removed. Marsupialization was attempted in 1 case, but this procedure was followed by excision and bowel resection. Aspiration was not attempted in any of the cases.

The cystic masses were located in the following mesenteric areas: duodenojejunal, 1; jejunal, 1; ileal, 3; cecum and ascending colon, 2; transverse colon, 1, and site undetermined, 3. In 1 case the expanse of the cyst, filling the entire abdomen, was so great that the size could not be satisfactorily determined. The diameter of the cysts when seen at subsequent operations varied from 2 to 28 cm. The masses that could be palpated were described as smooth, round or oval and large and globular. In 2 cases the specimens showed multilocular compartments. In 7 cases the fluid contents were described as milky. In 1 case the contents of the poorly calcified cyst were of the consistency of butter. In 3 other cases the fluid was described as yellow. In 9 cases enlarged lacteals in the base of the cyst and dilated lymphatics were noted during operation and at subsequent pathologic study. An endothelial lining could be demonstrated in 5 of the 11 cases. A fibrous lining was observed in 3 cases; smooth muscle, in only 1. In 2 cases there were pockets of epithelium suggestive of the enteric tract. Evidences of hemorrhage or inflammation were present in 4 cases. Although fatty degeneration was observed in 1 case, no cholesterol clefts were noted. The postoperative course, with the exception of 1 case, was uneventful, and no deaths attributable to surgical intervention occurred in this series.

COMMENT

Certain significant observations can be made from this material. It was interesting to rediscover that a fair-sized mass may be present in the abdomen without the patient's being aware of its presence. In at least a third to one-half of the cases, the presence of the mass escaped the notice of the examiner on abdominal palpation. It was noteworthy that the diagnosis depended upon the examiner and, in part, upon his specialty. Thus, in the cases of mesenteric cyst situated in the abdomen, the diagnosis was invariably ovarian cyst if the examiner was a gynecologist. It is agreed that the problem of evaluating a marked cystic mass in the pelvis is a difficult one, in that satisfactory differentiation from an ovarian cyst cannot be made. It should be remembered that statistically the chances that a mesenteric cyst will occur in this area are far less than the chances of an ovarian cyst. When the mesenteric cyst was encountered in an infant, it was usually associated with some acute abdominal episode resembling intermittent bowel obstruction. The clinical diagnosis in these cases was usually intussusception. In Case 6, in which displacement of the bowel loops occurred, these changes, together with the position of the mass, suggested the presence of a mesenteric cyst. One observer has suggested that this may also represent a remnant of the omphalomesenteric duct.

To aid in evaluation of the abdominal masses, roentgen studies were invaluable; first, in excluding these symptoms as representing the primary site of the tumor, and second, in determining the intra-

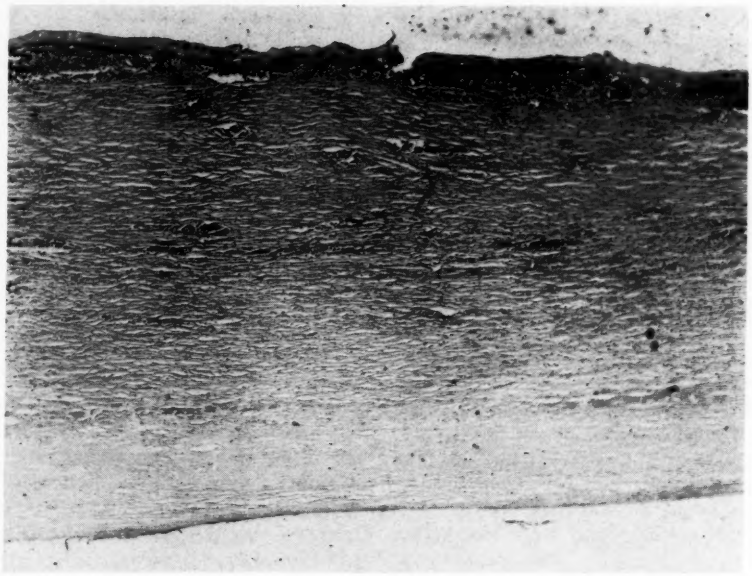

Fig. 13 (*Case of C.N.DeN.*).—Photomicrograph (× 150) of the section of cyst wall removed after exploratory laparotomy in a 29-year-old white woman. The preoperative diagnosis was ovarian cyst. The wall is composed of dense collagenous fibers with small penetrating vessels. There are numerous lymphatic channels and small focal accumulations of lymphocytes. The lining, where present, shows flattended endothelium. Large areas of the inner surface are denuded and are lined by connective tissues with congestive capillaries.

abdominal or retroperitoneal position of the mass. If such a mass is small and not palpable abdominally, roentgen studies may demonstrate its presence. In such cases the critical size of the mass is the determining factor, although the mass must first of all be large enough to produce an indentation phenomenon or displacement of the bowel loops or the abdominal viscera. On the other hand, very large masses that fill the abdomen and displace the bowel loops and viscera to a marked degree are difficult to identify, and their site of origin in most cases cannot be determined.

Each of the film studies served a specific purpose. In several cases the mass could not be readily identified in the supine film but became more distinct when the prone flat film was done. In none of the scout film studies was there any deformity of the psoas margin, which indicates that this portion of the posterior abdominal wall, at least, was not the site of origin of the mass. The peripheral margins of the mass were best identified by the displaced barium-filled loops (Fig. 11*A*). Fluoroscopic manipulation often aided in determining whether the mass was superficially placed or deeply seated in the peritoneal cavity. It was our impression that the gastrointestinal studies gave more information if the mass was situated in the upper part of the abdomen or in the umbilical or the paraumbilical area.

Certain observations could be made from the roentgen studies of the small bowel. Although displacement of the bowel loops could be observed and there was evidence of localized alteration at the sites of the attachment of the cyst, there was no evidence of an irritation or segmentation pattern producing widespread

alteration of the small bowel loops. The exceptions to this were (1) the case of the mesenteric cyst associated with extensive ulcerative ileocolitis, and (2) the case in which extensive bowel changes developed after excision of the cyst and resection of a large segment of the adjoining small bowel. One factor in the production of the extensive small bowel changes could be found in the marked hypoproteinemia observed in the case in which there was associated extensive ulcerative colitis. What relation these intestinal changes had to the mesenteric cyst cannot be adequately determined. In the cases in which there subsequently developed the changes consistent with nonspecific ileitis, the massive small bowel resection, the impairment of blood supply and the physiologic alteration of the bowel must be considered important factors in the causation of the subsequent changes. It must be remembered that in all cases sufficient intestine must be preserved to insure proper nutrition. With the larger masses, the size of the mass largely determined the amount of bowel that required resection after excision of the cyst. The size of the mass, however, did not determine the type of operative procedure employed; or the operability of the lesion.

Pathologically, it was necessary that sections taken from various portions of the cyst wall be examined, in order to make certain that there were no associated malignant lesions. This procedure is also utilized to exclude the presence of pancreatic cyst. Several cases were encountered in this study in which the clinical picture simulated that of mesenteric cyst. Only in studies of multiple sections could an adequate differential diagnosis be obtained. The exact nature of the masses could not be disclosed until exploratory laparotomy was done and pathologic studies completed. Although, as we have pointed out, a mesenteric cyst has little pathologic significance, it may present serious surgical problems and must be differentiated from a large number of malignant space-occupying lesions. It has been shown that one-third of all palpable abdominal masses are malignant. This emphasizes the seriousness with which all abdominal masses must be viewed.

SUMMARY

Eight of the 11 mesenteric cystic masses observed in the Grace Unit between 1934 and 1950 were chylous mesenteric cysts. The cases are reviewed and the histopathologic data presented. The diagnosis, surgical treatment, and preoperative and postoperative care of patients with chylous mesenteric cysts are stressed.

These masses may arise from various sources, since a common mode of origin cannot be described. Although the underlying etiologic factors vary greatly, they determine the histopathologic character of the cysts. Classifications of the etiologic factors in the development not only of chylous cysts but of all intra-abdominal cystic masses are presented.

Although these cysts may be preformed and of congenital origin, they may also follow trauma and infections of the peritoneal cavities. An increasing incidence of malignancy in such cysts is reported, but no neoplastic changes were encountered in our group of cases. No age or sex predilection for chylous cysts could be determined. Such cysts were located in the mesenteric attachments from the duodenum to the rectum. The importance of preoperative roentgenographic procedures is stressed, first, to exclude the gastrointestinal and urinary tracts as the site of origin of these masses and second, to determine the abdominal position of the masses.

In many cases roentgen studies will aid in determining the size and extent of the mass by the "indentation phenomena" produced. The surgical handling of these cystic masses is best determined after laparotomy.

Excision of the mass (despite the extreme variation in the size of the cyst), with resection of the adjacent bowel when the blood supply to the intestine was

impaired was successfully utilized in all of the operative cases.

Marsupialization my be adequately utilized when justified. Improved surgical technics, the use of chemotherapy and antibiotics and the maintenance of protein and acid-base balances will aid greatly in reducing the mortality rate. Thus, while the study shows that there are no pathognomonic signs and symptoms indicative of chylous cysts, the possibility of the presence of such cysts should be considered more frequently in the differential diagnosis of abdominal tumors.

RIASSUNTO

8 su 11 masse cistiche mesenteriche osservate alla Grace Unit fra il 1934 e il 1950 erano cisti chilose mesenteriche. Viene fatta una rassegna di tali casi con i rispettivi dati istopatologici, la diagnosi, la cura chirurgica e la terapia pre- e post-operatoria. Queste cisti possono avere origine varia, così che non è possibile descrivere un'unica modalità di insorgenza. Ma, benchè i fattori etiologici determinanti siano molto vari, essi tuttavia determinano i caratteri istopatologici della cisti. Viene presentata una classificazione dei fattori etiologici che intervengono nello sviluppo delle cisti chilose e di tutte le masse cistiche intraaddominali.

Benchè tali cisti possano essere pre formate e di origine congenita, esse pos sono anche essere consecutive a traumi c a infezioni delle cavità peritoneali. Viene riferito un aumento di frequenza nella malignità di tali cisti; tuttavia non vi fu alcuna trasformazione neoplastica nel gruppo di casi presentati.

Impossibile stabilire alcuna predilezione di età o sesso. Le cisti possono essere situate all'inserzione mesenterica dal duodeno al retto. Viene sottolineata l'importanza dell'indagine radiologica preoperatoria per escludere l'appartenenza di queste masse al tubo digerente o alle vie urinarie e per stabilire la posizione nello interno dell'addome.

Spesso l'esame radiologico sarà di aiuto nell'indicare le dimensioni e l'estensione della massa mediante i "fenomeni di compressione". La possibilità di manovre chirurgiche, tuttavia, verrà stabilita meglio alla laparatomia.

In tutti i casi operati venne eseguita con successo l'asportazione della massa (senza riguardo alle dimensioni di essa) e la resezione dei segmenti intestinali contigui quando la loro nutrizione era compromessa.

In qualche caso può essere giustificata la marsupializzazione. La mortalità operatoria potrà essere abbassata notevolmente con lo aiuto di più progredite tecniche chirurgiche, con l'impiego della chemioterapia e degli antibiotici e col mantenimento del bilancio proteico ed acido-basico. Quindi, benchè lo studio dimostri che non vi sono sintomi patognomonici per riconoscere la cisti chilosa, pure bisogna tener presente la possibilità di tali cisti nella diagnosi differenziale di ogni tumore addominale.

RESUMEN

Se revisa una estadística de la Unidad Grace de 1934 a 1950, sobre casos de quistes mesentéricos, observándose la ocurrencia de los quilosos en la proporción de 8 a 11. Se hacen consideraciones clínicas, histopatológicas y quirúrgicas respecto a los casos de quistes mesen téricos quilosos.

Se comenta la etiopatogenia del padecimiento, mencionando la relación de la misma con el carácter histopatológico de los quistes, clasificándose los factores etiológicos en general. Se comunica un aumento en la incidencia de malignidad de dichos quistes, sin encontrar modificaciones al respecto en el grupo estudiado. Se hacen consideraciones sobre edad, sexo, localización patológica señalando la importancia de los procedimientos röntgenográficos para la mencionada localización posición abdominal tumoral, pudiéndose determinar tamaño y extensión.

La excisión con resección del intestino adyacente por deficiencia de irrigación

sanguínea, fué utilizada satisfactoriamente en todos los casos. Puede utilizarse adecuadamente la marsupialización cuando está justificada. Mejoramiento en las técnicas quirúrgicas, el uso de sulfas y antibióticos y el mantenimiento del equilibrio proteico y ácido-base serán de gran ayuda para reducir el índice de mortalidad. En fin, no habiendo signos ni síntomas indicadores de quistes quilosos, debe considerarse más frecuentemente la posibilidad de dichos quistes en el diagnóstico diferencial de los tumores abdominales.

SUMARIO

Oito dos onze tumores cisticos mesentericos observados na Grace Unit entre 1934 e 1950 eram cistos mesentericos chilosos. Os casos são revistos e os dados histopatologicos são apresentados. O diagnostico, tratamento cirurgico e cuidados pre e postoperatorios de pacientes com cistos chilosos mesentericos são reacçandos.

Esses tumores podem se originar de varias fontes, pois que uma origem ou modo comum não podem ser descritos. Embora os fatores etiologicos subjacentes variem enormemente, eles determinam o carater histopatologico dos cistos. São apresentadas classificaçõesde fatores etiologicos no desenvolvimento não so de cistos chilosos mas de todos os tumores cisticos intra-abdominais.

Ainda que estes cistos possam ser preformados e de origem congenita eles podem tambem ser consequencia de trauma e de infecções da cavidade peritonial. Uma crescente incidencia de malignidade em tais cistos é relatada, mas nenhuma alteração neoplastica foi encontrada em nosso grupo de casos. Nem idade ou predileção por sexo ponde ser determinada com relação aos cistos chilosos. Tais cistos podem ser localizados nas conexões do mesenterio com o duodeno ou com o reto. A importancia dos processos roentgenograficos preoperationios é realçada, primeiramente para excluir o trato gastrointestinal e urinario como sitio de origem desses tumores e secundariamente, para determinar a posição abdominal dos tumores.

Em muitos casos os estudos roentgenograficos ajudarão a determinar o tamanho e extensão do tumor pelo "fenomeno de indentação" produzido. O manuseio cirurgico dessas massas cisticas é melhor determinado apos laparotomia. A exerese do tumor (a despeito da extreme variação no tamanho do cisto) com ressecção irrigação sanguinea é deficiente, foi sucessivamente utilizado em todos os casos operatorios. A marsupialização pode ser adequadamente utilizada quando justificada. Tecnicas cirurgicas aperfeiçaodas, o uso de quimioterapia e antibioticos e a manutenção de proteinas e balanço acido-basico ajudara enormemente a reduzir a taxa de mortalidade. Assim, emquanto este estudo mostra que não ha sinais patognomonicos e sintomas indicativos de cistos chilosos, a possibilidade da presença de tais cistos deve ser considerada mais frequentemente no diagnostico diferencial de tumores abdominais.

RÉSUMÉ

Huit des onze masses kystiques du mésentère trouvés au Grace Unit entre 1934 et 1950 étaient des kystes du mésentère chyleux. Les auteurs repassent l'histologie, le diagnostic, le traitement, les soins pré et post opératoires de ces patients.

Les auteurs discutent aussi de la formation de ces masses; de leur étiologie et aussi de la classification.

Ces kystes peuvent être d'origine traumatique ou congénitale. On rapporte une augmentation de fréquence de malignité. Il n'y a pas d'âge particulier.

La radiographie est d'une grande utilité pour éliminer des masses pouvant être dans le système gastro-intestinal ou urinaire.

Le traitement consiste dans l'extirpation chirurgicale, par la laparatomie. Les auteurs repassent les divers procédés en usage.

ZUSAMMENFASSUNG

Unter elf zystischen Geschwuelsten des Mesenteriums, die von 1934 bis 1950 in der Grace-Klinik beobachtet wurden, befanden sich acht chyloese mesenterische Zysten. Die Faelle werden beschrieben und die histopathologischen Befunde wiedergegeben. Die Diagnose, die chirurgische Behandlung und die prae-und postoperative Versorgung der mit chyloesen mesenterischen Zysten behafteten Kranken werden genau besprochen.

Da ein allgemeiner Entstehungsmodus dieser Geschwuelste nicht bekannt ist, besteht die Moeglichkeit, dass sie von verschiedenen Quellen stammen. Die zu Grunde liegenden aetiologischen Faktoren sind sehr verschieden und bestimmen den histopathologischen Charakter der Zysten. Die aetiologischen Faktoren in der Entwicklung nicht nur der Chyluszysten sondern aller zystischer Geschwuelste des Bauches werden klassifiziert. Die Zysten koennen vorgebildet und kongenitalen Ursprungs sein, koennen aber auch als Folge von Verletzungen und Infektionen der Bauchhoehle auftreten. Es liegen Berichte von einer Zunahme der Boesartigkeit unter solchen Zysten vor; in der hier besprochenen Serie von Faellen aber wurden keine neoplastischen Veraenderungen beobachtet. Bevorzugung eines Geschlechts oder einer Altersgruppe konnte bei Chyluszysten nicht festgestellt werden. Die Zysten koennen in jedem Abschnitt des Mesenteriums, vom duodenalen bis zum rektalen Segment, gelegen sein. Die Wichtigkeit der praeoperativen Roentgenuntersuchung wird betont, erstens, um den Verdauungskanal und das Harnsystem als Sitz der Geschwuelste auszuschliessen, und, zweitens, um die Lage der Tumoren innerhalb des Bauches zu bestimmen. In vielen Faellen wird die Roentgenuntersuchung auf Grund des "Eindellungsphaenomens" zur Bestimmung der Groesse und Ausdehnung der Geschwulst beitragen. Das chirurgische Vorgehen bei diesen zystischen Geschwuelsten wird am besten nach Eroeffnung des Bauches entschieden.

In allen operativen Faellen wurde (trotz extremer Unterschiede in der Groesse der Zysten) die Resektion der Geschwulst und, wenn die Blutversorgung des Darmes beeintraechtigt war, des angrenzenden Darmabschnittes mit Erfolg ausgefuehrt.

Marsupialisierung kann, wo sie gerechtfertigt ist, in angemessenem Umfang ausgeführt werden. Verbesserte chirurgische Technik, Anwendung chemotherapeutischer und antibiotischer Mittel und Erhaltung des Eiweissspiegels und des Saeure-Basen-Gleichgewichts tragen erheblich zur Herabsetzung der Sterblichkeit bei. Die Arbeit zeigt, dass es keinerlei pathognomonische fuer Chyluszysten charakteristische Krankheitszeichen gibt. Trotzdem soll man bei der Differentialdiagnose von Bauchgeschwuelsten oefter an die Moeglichkeit solcher Zysten denken.

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Early and Late Care of the Traumatic Maxillofacial Wound: Report of Cases

Surgical Repairs in Korean Casualties

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IT is the purpose of this paper to describe the various stages of maxillofacial reconstruction that are successfully followed today. Owing to the possibility of eventual mass casualties, it becomes apparent that methods of preliminary care for all types of lesions should be common knowledge. In order that the information be appreciated, the relation to subsequent care will be outlined and methods of each procedure indicated. In addition, there will be illustrations of final surgical attainments and methods of repair. The object here will be to define early and late care of the maxillofacial wound in a workable stage procedure process. Early care is stressed, indicating the primary objectives to be preservation of life and conservation of tissue. The points recorded will show the repair process of the facial wound to be a developmental stage sequence from the time the patient is initially observed through the various hospitalizations. Reconstruction is to be looked upon as following a uniform plan. The final result or complete repair is the sum of all the separate surgical stages.

Early Care.—As soon as a facial wound is sustained, three points in its care must be of immediate concern: the cessation of hemorrhage, the establishment of a free airway, and the stabilization of the parts. One may attempt to stop bleeding, first, by applying digital pressure on known parts. This pressure, when applied, should be properly located over a feeder blood vessel and in such a way that the blood vessel will be compressed against some hard structure. Control of hemorrhage may be accomplished by the application of pressure through a gauze pack. This gauze pack is helpful for inaccessible bleeders. If hemostats are at hand, the lacerated vessel can be clamped and tied. It is important to bear in mind that tissue should not be manipulated more than necessary, for it is possible to advance infection into deeper recesses. If the gauze pack is employed to stop bleeding, its pressure must be maintained continuously for a period of time. It is not necessary to put great pressure through a gauze pack. Such pressure, improperly applied, may strangulate structures. A small amount of pressure, properly placed, will collapse the vessel. The gauze pack should be held with moderate pressure. To insure an airway, an immediate attempt may be made to remove blood clots and foreign material from both the mouth and the nose. A rubber tube slipped through the nose or over the dorsum of the tongue may be helpful. When the tongue drops back in the throat, as during an unconscious state, or from lack of support due to fracture of the mandible, the attendant may lift up on the tip of the chin and pull out the tongue. The applied method is similar to that which is used occasionally in giving an anesthetic for a surgical operation. The preliminary stabilization of bones and soft tissue is the third goal. The movement of injured parts jostling around may cause the recurrence of hemorrhage or occlude the recently established airway. This movement is pain-

From the Brooke Army Plastic and Maxillofacial Center, Brooke Army Medical Center, Fort Sam Houston, Texas.
Read by title at the Eighth International Congress of the International College of Surgeons, Madrid, Spain, May 24, 1952.
Submitted for publication July 6, 1952.

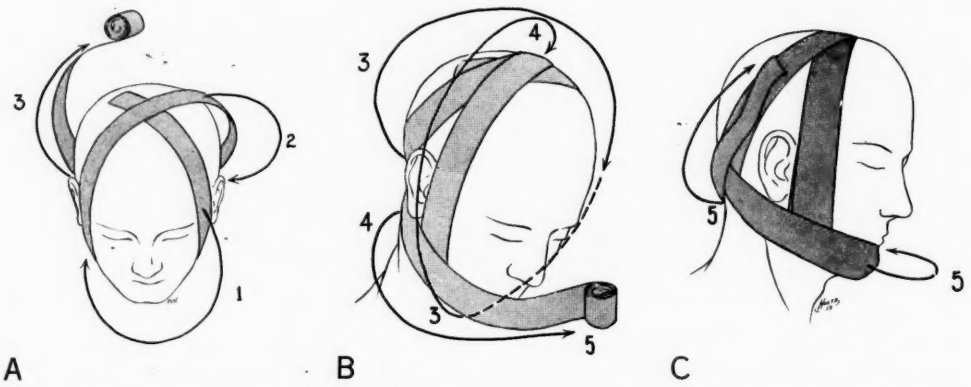

Fig. 1.—Modified Barton bandage application. Beginning at vertex (*1*), bandage swings down around chin and up, crossing top of head (*2*). The bandage continues around occiput (*3*), then up, crossing top of head, continuing along dotted line, down around chin and up (*3*), becoming (4). *4* passes around occiput, but this time instead of passing upward, continues forward around tip of chin, becoming *5*.

ful as well, and therefore may be considered a shock factor. Stabilization at this stage may be accomplished by some simple means; the Barton bandage has been the most helpful method for temporary control (Figs. 1 and 2). Members of the Medical Department in combat zones ordinarily are supplied with first aid packets. These sometimes are admirably adapted for the treatment of facial wounds. The compress, with its lateral tail, can be used as a sling to hold and support torn and loose tissues (Figs. 3 and 4). If gauze packs are not available, the compress itself can be separated from the bandage part and used as a pack or dressing. In combat zone care, tracheotomy should be considered as a last resort, for at this stage little more can be accomplished than the application of the compress and the four-tailed bandage. When intrinsic fractures of the bony architecture are present and a dental surgeon is available, some temporary splinting of the teeth by application of wires may be feasible. Intermaxillary rubber band fixation would be the only consideration, and even this would not be applied if transportation or evacuation is to be accomplished unattended by members of the Medical Department. The object in preliminary treatment will be to prepare the patient rapidly and adequately so that he may be transported to a station back of the combat zone where he may receive more specialized treatment.

Proper positioning of the patient for transportation may reduce the mortality rate among patients with maxillofacial wounds. If a patient is ambulant or semiambulant, it would be well for him to be transported sitting up. If he is a litter case, the position would be face down, if there is any danger of obstruction of the air passages (Fig. 5).

When time is favorable and the setting proper, one may attempt some early care. If this can be done, the surgeon will attempt to save all the bone and soft tissue possible, remembering always that it is better to leave tissue that may die than to cut away some that may live. A few therapeutic cautions would be: Do not remove fragments of bone that are attached to periosteum or muscle; do not probe around for foreign bodies; débridement is not indicated as part of first aid treatment; parts must not be manipulated any more than is absolutely necessary for the purpose of stopping the bleeding, establishing the airway or stabilizing the parts.

At the first hospitalization, if conditions are appropriate, the routine would be, first, to check for breathing and a free

airway; second, to consider the patient as a neurologic problem, and third, to examine the wound. In the last-mentioned care, one looks for fractures of the bony architecture, checks for lacerations or tears into the mouth, nose and conjunc-

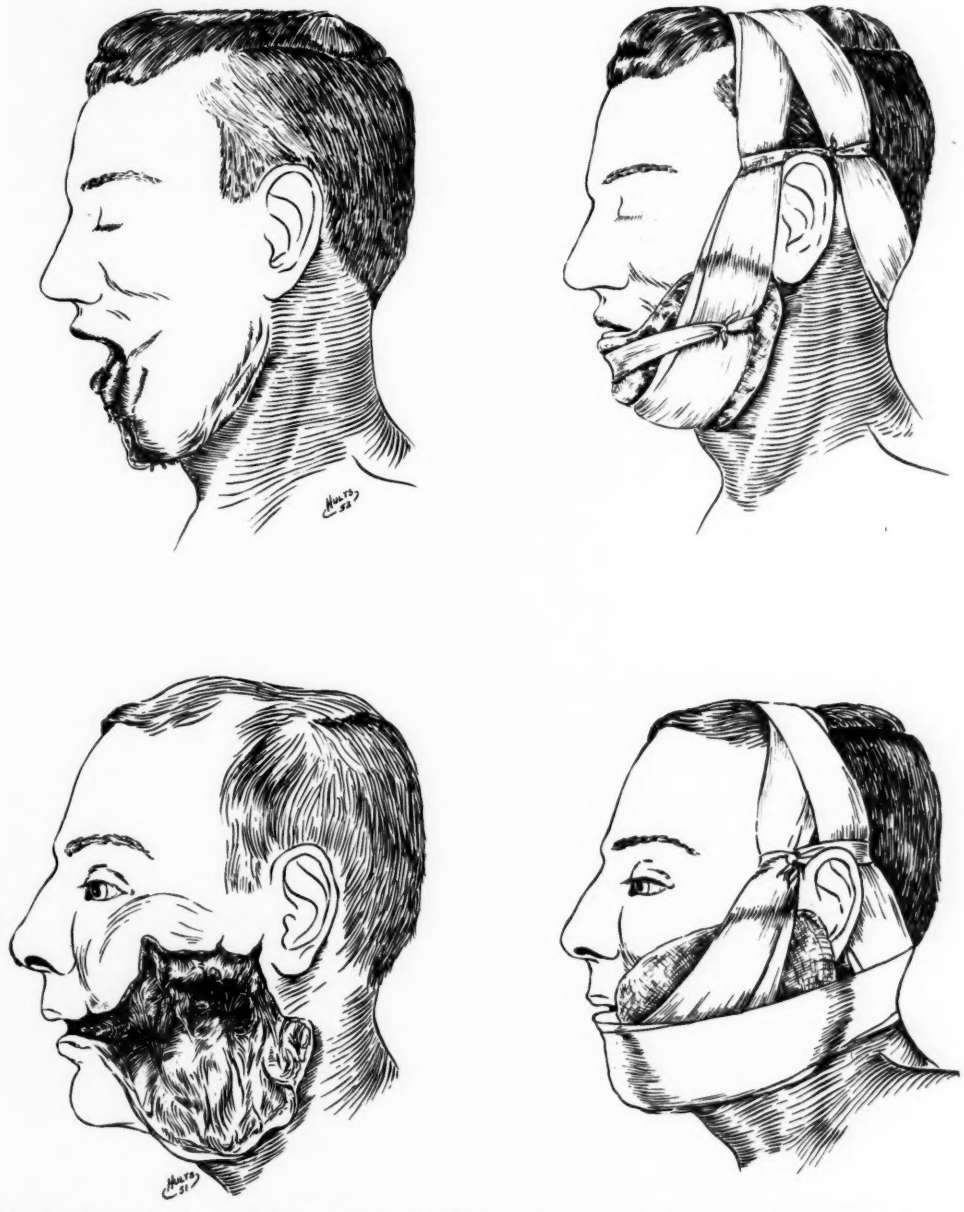

Fig. 2.—Demonstration of the application of Barton bandage for chin and cheek defects. Small strips of bandage or adhesive tape will add security to the fixed position.

tiva, examines the eyeball, checks the function of the seventh nerve, and examines for bony and soft tissue obstructions of the nasal airway and damage to the parotid duct. Roentgenograms will help reveal the presence of fractures and also nasal sinus involvement. It is important to check the condyles of the mandible and palpate the orbital border, the frontal bones and the whole zygomatic area.

Primary repair is best achieved before swelling and infection occur. It is preferable to carry out the surgical procedure in the first twelve to twenty hours. Time lapse between accident and wound closure depends upon the kind and type of wound and upon surgical judgment. For example, it is well known that infection sets in early in contused and crushed tissues. A cleancut laceration can be united as long as twenty-four hours after injury with good results. Delay of primary repair is recommended in the presence of neurologic damage. Jaws should not be fixed until the patient is free from vomiting. The anesthesia preferred is local, infiltration, and nerve block, bearing in mind that the wound edges are sometimes insensitive. General anesthesia

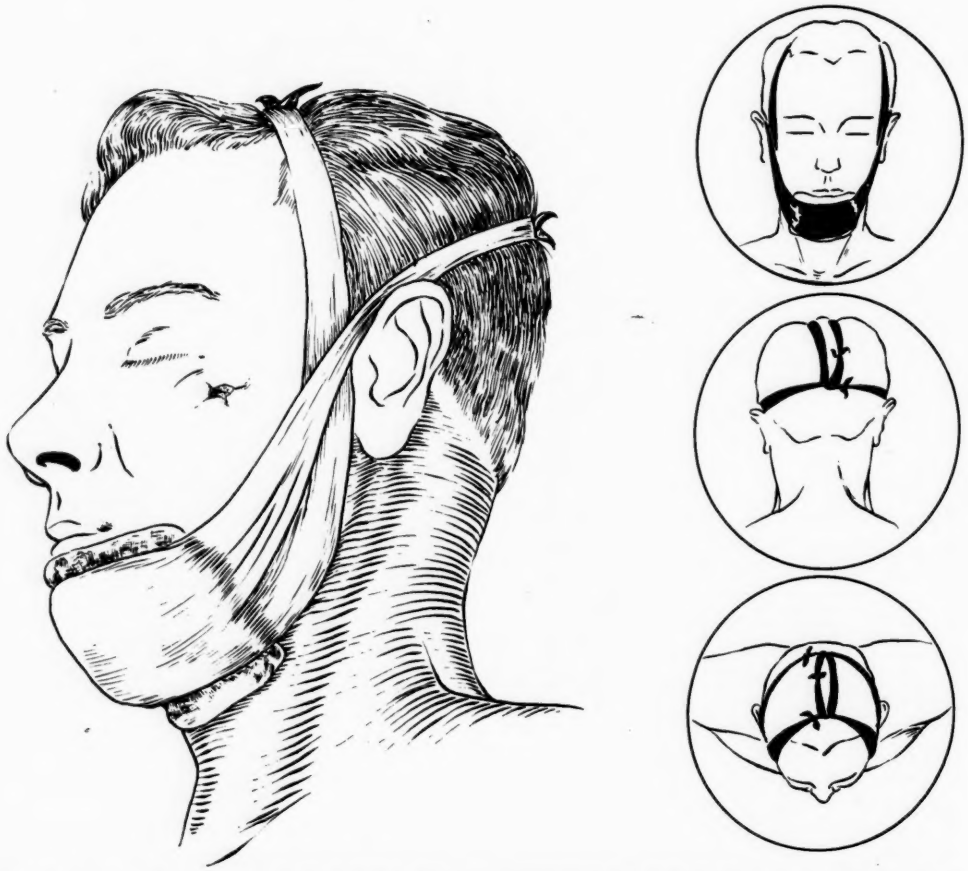

Fig. 3.—The first aid bandage is helpful. In this illustration the tail on each end of the attached pack has been split, making it a four-tailed dressing.

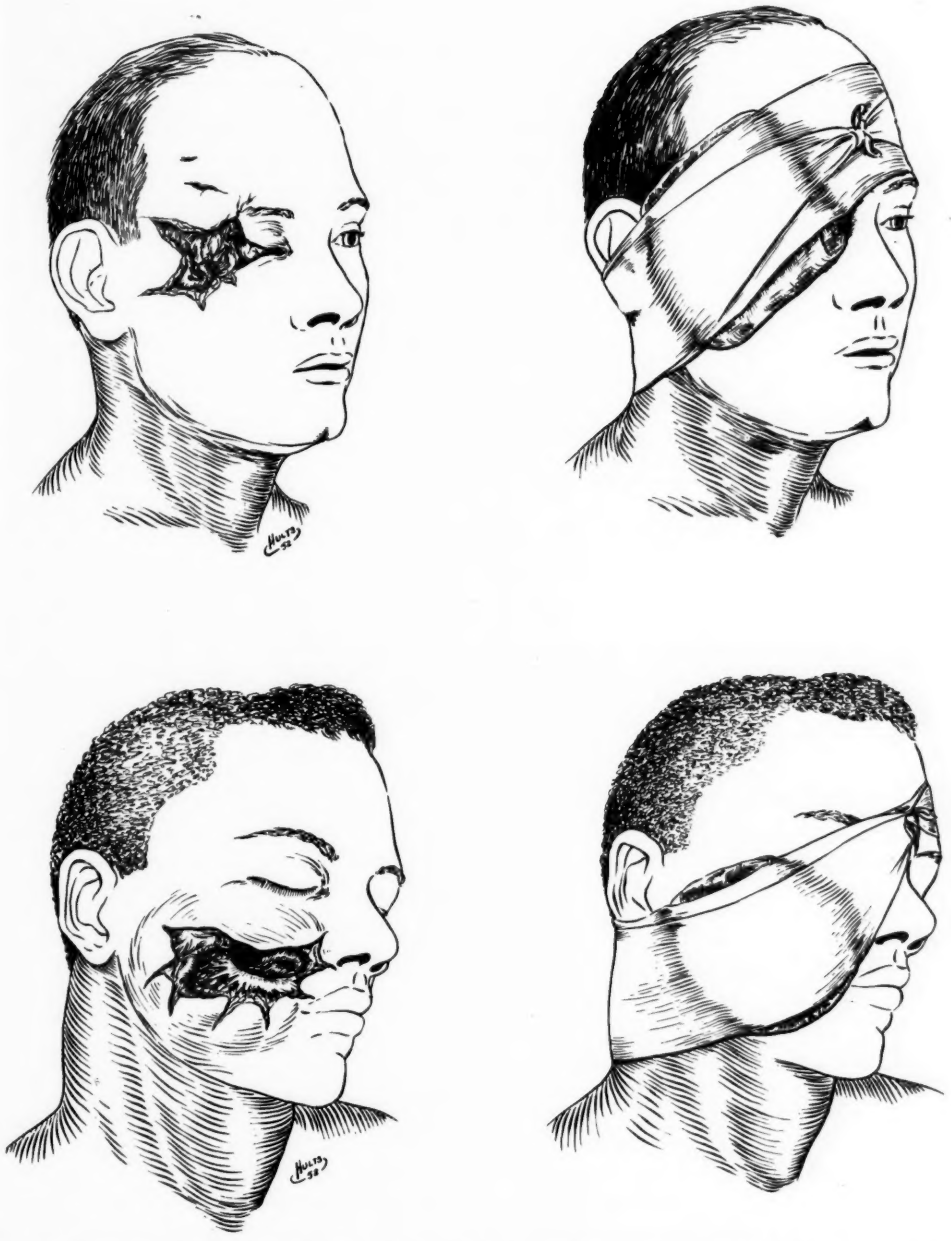

Fig. 4.—First aid application of the pad or pack and roller gauze dressing for lesions of the upper part of the facial area.

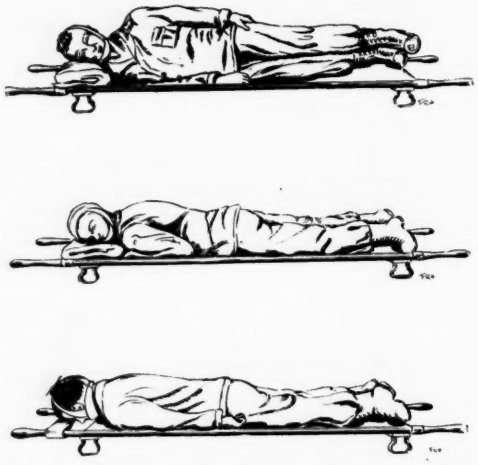

Fig. 5.—Proper positioning of the patient for transportation may reduce the mortality rate in the maxillofacially wounded patient. If he is ambulant or semi-ambulant, it would be well for him to be transported sitting up. If he is a "litter case," the best position would be face down if there is any danger of obstruction of the air passage.

is avoided if possible. Débridement is carried out on the wound if indicated. This begins with cleansing with saline solution, soap and water, with ether as a solvent. Foreign bodies are removed. Surgical excisions are limited. Only obviously dead tissue is excised. Radical surgical measures sometimes destroy what later might be salvaged as a feature. Attempts are made to conserve bone fragments. Any portion of bone that is attached is left in place. Those exposed should have the areas covered by suture of adjacent soft tissue, if possible. Occasionally soft tissues are disrupted and torn away, with much bone exposure. Direct fixation is sometimes considered; when this is accomplished, drains are left in place.

Types of fractures of the maxillae are many and varied. Sometimes they may occur singularly or in combination. Recent fractures of the mandible, which show no bony loss and are associated with no fractures of the superior maxilla, are generally treated best by the simple method of intermaxillary rubber band fixation. The upper jaw is used as a splint. The displaced fragments are reduced by utilization of the rubber band traction. The multiple loop intermaxillary wiring with intermaxillary rubber band fixation has been shown by Stout to be the one most applicable for the early care of the war wounded (Fig. 6*A*). It carries the least danger in fracture reduction and in many cases gives the best results. Splinting of the jaw for bony fractures is instituted as soon as the patient's general physical condition has become stabilized. Through-and-through bone wiring for fragment control ordinarily is contraindicated. The dangers are: rotation distortion, necrosis around the wires and unnecessary compounding of bone. External pin fixation is contraindicated except when attempted by experts, and then only when insufficient teeth are present (Fig. 8). External pins do not always hold securely, and their use cannot be considered practical as a front line procedure. They tend to loosen in the bone, permitting undue mobility of the fragment and, unless aseptically inserted, causing scar dimpling of the face, which sometimes results in permanent scar tissue deformity. In the case of the edentulous mandible with fracture, circumferential wiring about a superimposed form fitting splint is the most satisfactory method for general use (Fig. 6*B*). The early care of the fractured mandible showing bone loss near the mandibular angle needs no especial treatment. Simple splinting of jaw to jaw is sufficient. When lateral losses necessitating bone graft are present no attempt is made to control the posterior edentulous fragment, unless a transplant is anticipated within the succeeding three months. The anterior superior displacement of the ramus fragment does not interfere with the mechanics of occlusion during the preliminary period, and it can be more advantageously cared for later. When the fracture line in the inferior maxilla lies posterior to the last occluding molar, some difficulty may be incurred from the action of the elevator muscle. If healing is permitted, with the

resultant displacement, the patient may eventually be unable to open his mouth normally. Occasionally a second or third molar is present and situated in such a way that its position in the fracture line maintains the posterior fragment in the proper place. In such an instance the tooth would be allowed to remain in the fracture line, for it acts as a wedge splint for this purpose. After about three weeks the surrounding soft tissue would be sufficiently firm to hold the fragment in proper alignment. At that time the tooth may be removed; if allowed to remain, it may continue to act as a foreign body, inhibiting proper healing. If no tooth is present to hold the ramus downward and backward, special intra-oral splints may be made to accomplish this. An alternative method would be transosseous wiring or use of the modified tantalum plate. Posterior traction by means of silver wire passed through the bone is now only occasionally employed. In the case of the partially edentulous jaw, when it is necessary to do intermaxillary fixation, the use of the half-round arch bar is satisfactory. Cross wires are passed over the arch bar to obtain proper fixation. The sectional splint introduced by Stout is valuable as well. Ordinarily little or no displacement is encountered in fractures of the ramus of the mandible. This is largely due to the muscle protection given by the pterygoid and masseter. Simple fixation of the lower to the upper teeth suffices. This is also the usual treatment for fractures of the neck of the condyle. Infrequently the occasion is such that open reduction is indicated. Fractures of the superior maxilla are seen in all degrees; from separation of small areas of the alveolar ridge to complete separation of all the upper facial bones from their attachment to the cranial base. Associated complications vary from simple ecchymosis and swelling of the soft tissue up to large lacerated wounds with associated fractures into the nasal fossa and sinuses. Every attempt should be made to replace the bone fragments in their proper anatomic position as soon as possible, for bony union takes place quite rapidly in this area. Accuracy is important, because slight variations from normal make noticeable variations in contour as well as influencing proper aeration and sinus drainage. Replacement is obtained by mobilization and constant pressure exerted in an upward direction. Restoration of occlusion and maintenance of position can be brought about in several different ways. A heavy arch bar may be secured to the teeth with wire ligatures. This in turn may be attached to a plaster head cast by metal side arms.

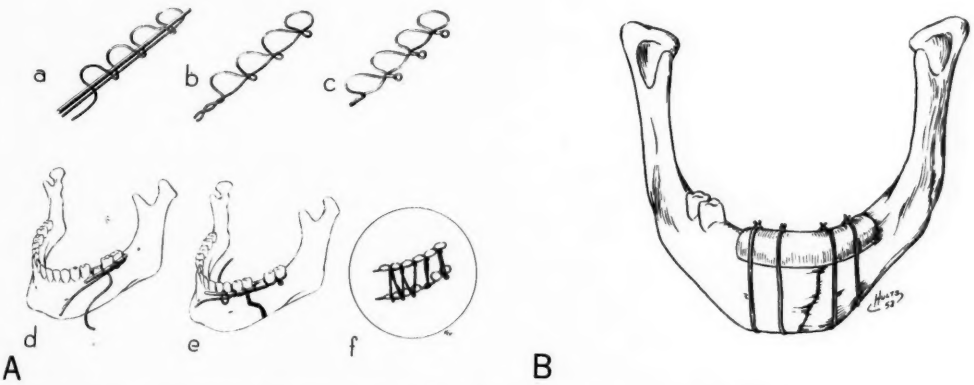

Fig. 6.—*A*, *a*, *b*, *c*, Colonel Stout's method of continuous wiring. The twisted loops (*c*), are turned to form hooks for the application of elastic hands, *f*. *B*, circumferential wiring with intra-oral splint. This method is preferred to the extra-oral pin technic in early forward care.

This method permits mobility of the lower jaw. If there is some doubt about obtaining proper occlusion, one may do intermaxillary wiring, securing the mandible in addition by an arm bar to the plaster head cast. In some cases, all that is needed may be a felt cap chin appliance and with intermaxillary fixation.

In the presence of any injury of the upper facial bones one should look for possible involvement of the zygomatic arch and malar bone (Fig. 7). The side supports of the latter are usual sites of fracture. It is not uncommon, however, to see the malar bone driven backward and downward and impacted in this position. These depressed defects sometimes cause fearful deformities: care must be instituted within the first ten to fifteen days, as replacement can be impossible after two weeks. The depressed malar may sometimes impinge upon the coronoid process of the mandible, mechanically interfering with jaw movements. Fractures of the orbital rims and floors also may be associated with displacements of the malar zygomatic compound. Fracture displacement of the orbital floor and lateral orbital rim is associated with downward and backward displacement of the eye globe. Upon clinical examination, when this has occurred, there is a resulting one-

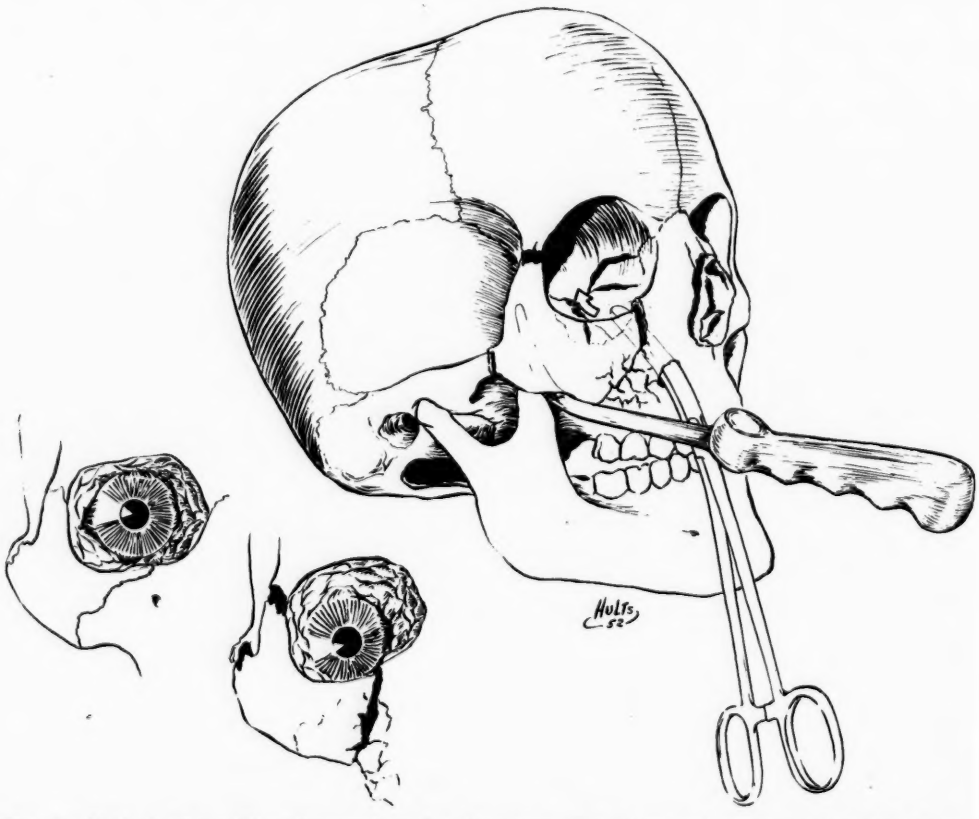

Fig. 7.—Method of handling depressed malar fractures. The intra-oral approach has been effective. The external method of Gilles is used for the zygoma alone. Entrance through the canine fossa permits replacement of orbital floor, elevating displaced eyeball. Wiring may be necessary to maintain replaced malar position. Pack suffices for orbital floor.

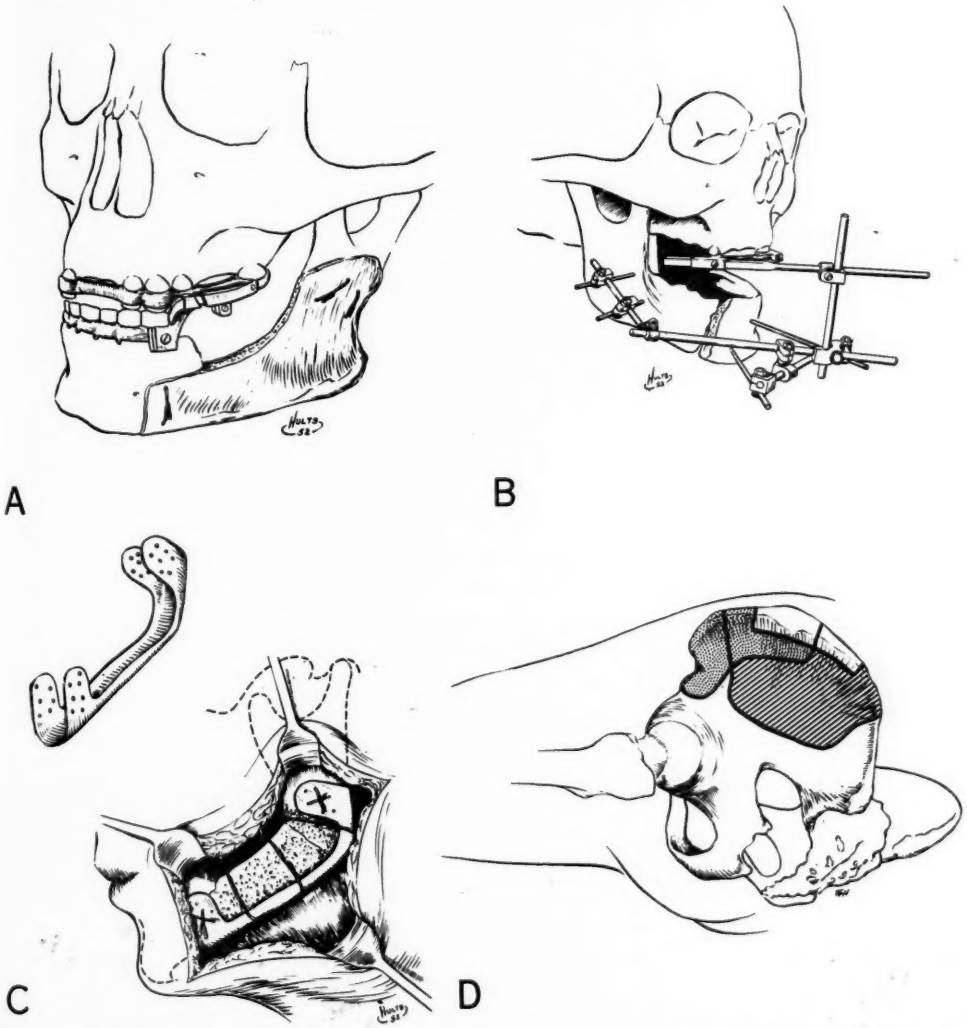

Fig. 8.—Definitive jaw procedures. *A*, large bone graft transplant from ilium, implanted to reconstruct mandibular continuity. *B*, extra-oral pin technic for the edentulous jaw. Stabilization augmented by fixation to upper jaw. (This procedure is to be employed only by the trained expert.) *C*, internal tantalum tray method for bone graft transplant; iliac bone decorticated. *D*, iliac donor site showing shaped excision areas.

sided flatness of the face. There is a definite pupillary descent as measured against the uneffected side, and the skin fold in the upper lid appears deeper than usual. The patient may complain of diplopia; this may be transitory or permanent. The lateral canthus of the eye may also be displaced. By palpation, one may notice a steplike notched defect of the lower orbital rim. When the malar bone is impacted into the antrum, crushing through the anterior wall, splinters and spicules may be present in the antrum as foreign bodies associated with

hematoma. Several surgical technics have been employed to replace these structures. An extra-oral approach has been valuable in some cases, though the intra-oral approach has been found most satisfactory in the majority of situations. In the former, the approach is through the temporal region. An elevator is passed between the muscle fibers and the temporal fascia, forward and downward, to the medial surface of the bone. The depressed fragment then is elevated into place by leverage, aided by the insertion of a gauze roll beneath the elevator as a fulcrum. This method is indicated for depressed fractures of the zygomatic arch. Interference caused by the masseter muscle sometimes contraindicates the intra-oral approach for this defect. Intra-oral approach to the antrum through the canine fossa allows the surgeon access to the depressed orbital floor plate. After the anterior wall of the sinus and malar has been elevated out of the way and loose spicules of bone and hematoma removed, one may replace the orbital floor. The gauze pack is left in place to maintain position. This should not be packed too tightly. It can be removed after a few days through the canine opening or through the newly formed naso-antral window. When it is difficult to maintain the reduced position, interosseous wiring of the frontal process of the zygoma to the lateral orbital rim may be necessary. A small external incision in the involved area suffices for approach. Stainless steel wires are satisfactory. These are passed through drill holes in both segments, reestablishing the continuity of the frontal zygomatic bones.

Bony fractures are sometimes associated with soft tissue defects. In attempting this type of repair, it is well to have a basic plan in mind. The assemblage should begin from some known point. This might be the vermilion border of the lip (Fig. 9, *A* and *B*) the nostril border or the eyelid margin. If it is impossible to find a key point to start the soft tissue repair, one attempts closure by placing the first suture in the center of the wound and bisecting the remaining segments. These methods are helpful also in replacing loose flaps. One attempts to unite the parts with normal appearance as the goal, but there is never any attempt made to improve the patient's natural appearance. The sutures when placed may be deep, but never wide. In some situations, stay sutures can be introduced from the inside. If they must be placed outside, they are left long and tied up over the broad gauze pack. Such sutures should be removed in three to four days.

Early treatment can do much for the wound that is filled with foreign pigment. Much of this can be scrubbed out if the treatment is instituted in the first twenty-four hours. After that, the small

Fig. 9.—*A*, poor wound closure; key points on vermilion lip border should have been approximated. *B*, repair; this might have been achieved at the initial operation. Terrain conditions may have been a modifying factor.

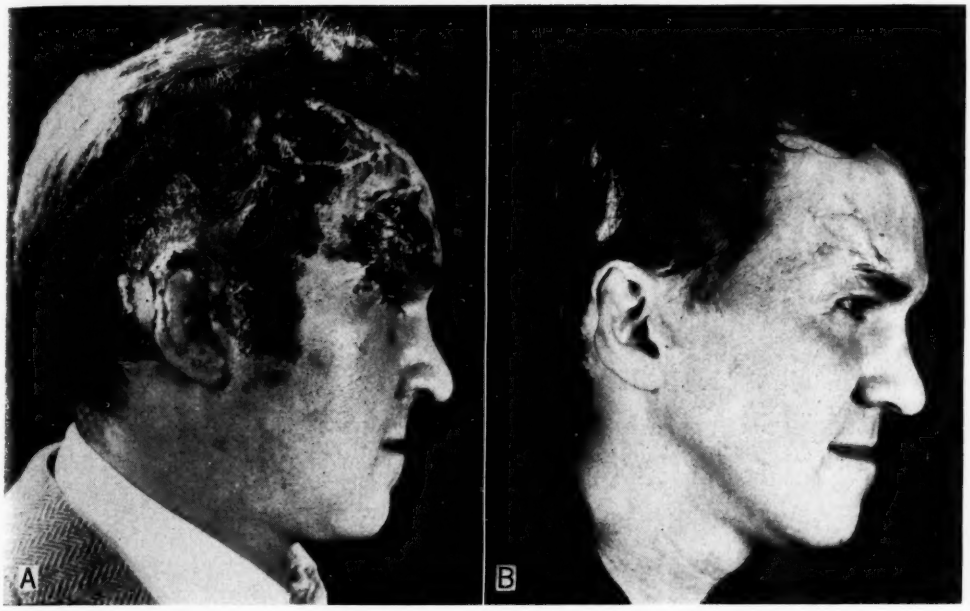

Fig. 10.—A severe facial wound, showing ground-in dirt and foreign pigment. Initial scrubbing followed by the late sandpaper technic produced the clean repair shown in *B*.

channels through which the pigment has entered may have been sealed off. When healing has occurred and the tattoo effect is quite disfiguring, use of the sandpaper technic, in combination with direct excision, may give desirable results. This definitive method removes much of the superficial pigment and may lighten the color 70 to 80 per cent (Fig. 9, *A* and *B*).

Methods of Definitive Repair.—When healed defects of the scalp and forehead are present, reconstruction of soft tissue continuity is established ordinarily by tissue shift and skin graft. Attempts to close scalp areas by pulling and tugging result in failure. To overcome the lack of elasticity and immobility, surface coverage is achieved by borrowing from elsewhere, either from the adjacent local area or from some remote region of the body, transfer being by intermediate carrier. In cases of forehead destruction, when soft tissue alone has been destroyed and the area healed by cicatrix, simple coverage replacement is all that is required. This may be accomplished by utilizing the free skin graft. If there has been an associated loss of skull bone, the problem becomes a compound one. It is necessary to replace the hard tissue as well as the soft tissue, so that the cerebral structures may have adequate protection. These hard structure replacements have been accomplished in a satisfactory manner by using tantalum plate or a bone graft. After a thick transplant of skin with subcutaneous tissue as a flap has grown in place, the bone graft or tantalum plate can be inserted. Unless there is soft tissue protection, supplied by a flap, the tantalum plate or bone graft will not be retained.

In traumatic orbital lesions in which the eye globe has been lost, lid repair can be accomplished along lines somewhat different than when the globes are retained. Reconstruction of eyelids in an anophthalmic situation may follow certain patterns. When the skin of the lower eyelid has been destroyed and there is

splaying out of the conjunctiva onto the adjacent cheek, sometimes repair can be accomplished by a single surgical step. Incisions may be carried along the junction of the conjunctiva and the adjacent skin border. The former, undermined, may be turned upward and a free skin graft placed on the combined denuded site. These grafts take well on the raw surface of the turned-up conjunctiva and cheek bed. The upper and lower lids must be anastomosed and left so joined, in some cases, as long as eight to twelve months. This procedure overcomes the contractile phase. Upper lid losses may be more difficult to handle. Rarely does one see the aforementioned type of residue when soft tissue of the upper lid has been destroyed. For the lids, pedicle flaps of all kinds are to be avoided if possible; they are always too thick and bulky and never give lifelike results. An alternative method which has been found to be satisfactory in our hands is to reconstruct the upper lid from the lower lid. Tarsus and conjunctiva are borrowed from the opposite lid. This is accomplished by separating these two from the skin like an apron, migrating it into the defect. The edges are joined to the remaining lid margin. A free skin graft can be made to grow upon this apron. After the tissue has been in place for sufficient time the lids can be separated, and the remaining constructed eyelid will be a far thinner affair than any pedicle flap.

There is, of course, a danger in any surgical procedure. In this situation, the one that must be avoided in reconstruction of the upper lid is the loss of the lower fornix. Should this complication occur, and the patient is anophthalmic, one may turn over skin from the lower lid as a flap and add a skin graft there. This will increase the depth of the fornix. Needless to say, there are many procedures which may be utilized in repair of

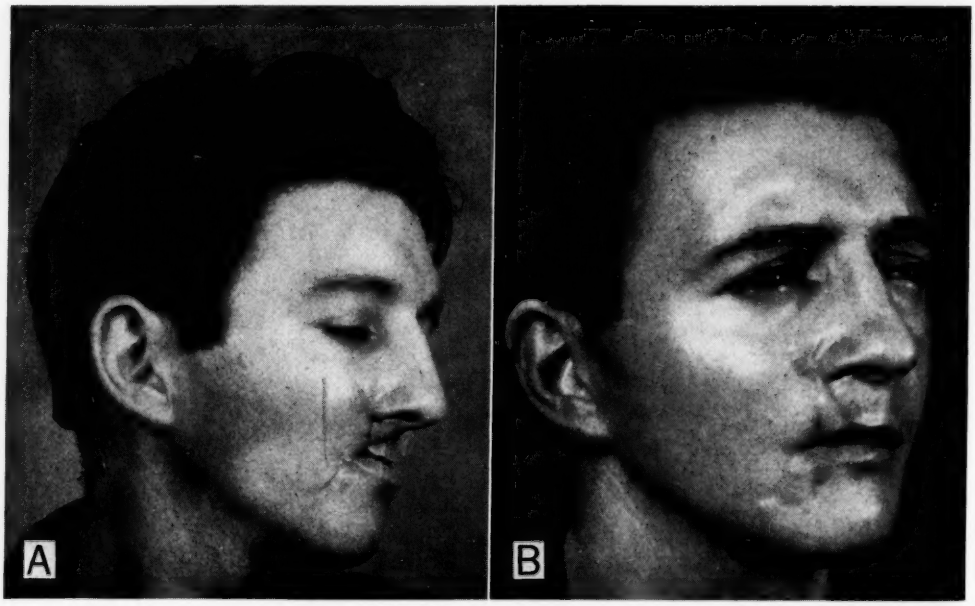

Fig. 11.—Korean casualty. *A* shows full thickness loss of upper lip and premaxillary area of upper jaw. *B* shows the repair, with use of an artery flap from the lower lip. An intra-oral skin graft extended the ridge and aided lip mobilization.

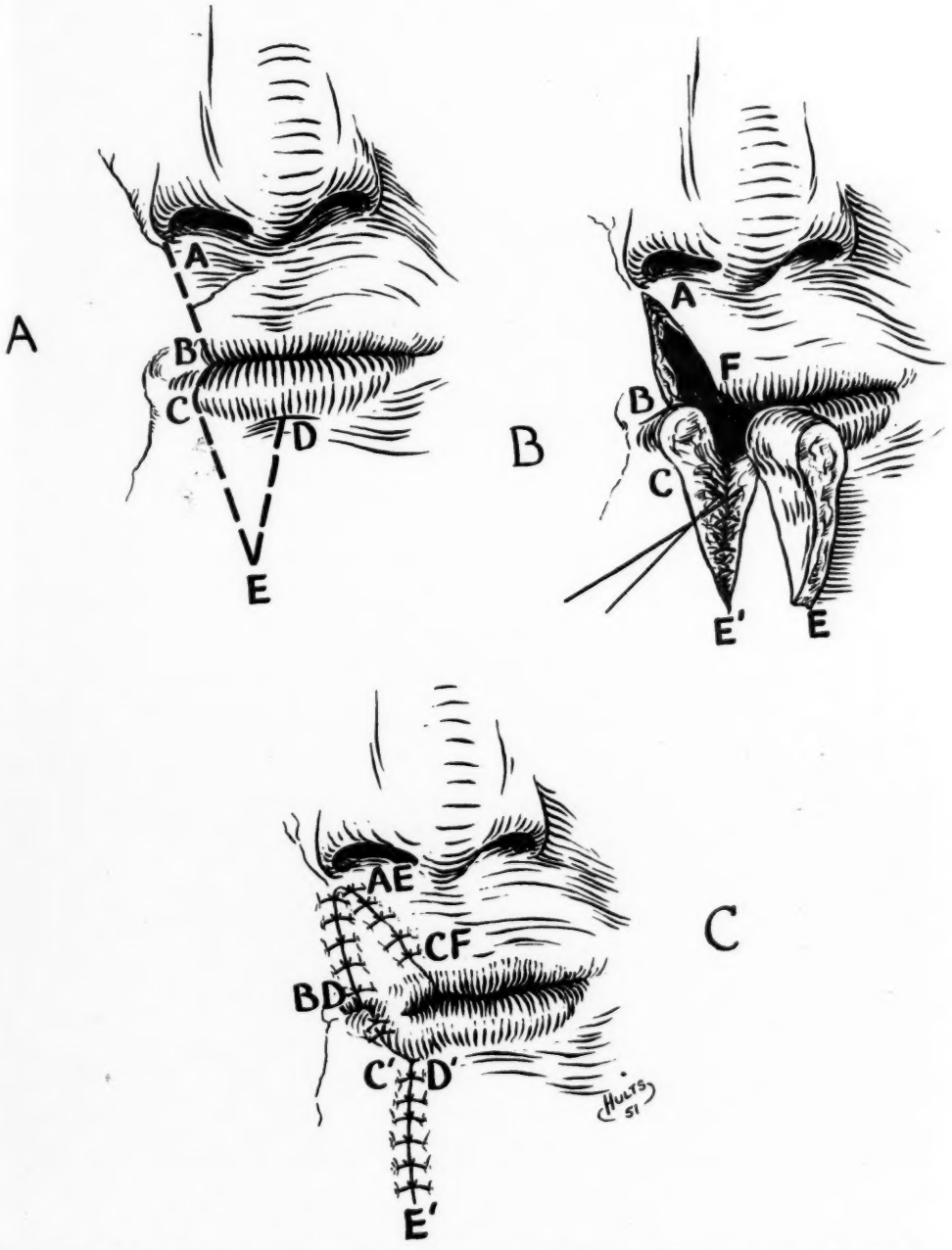

Fig. 12.—Incision *A-B* was made allowing lip spread. *C-E-D* was formed, the coronary artery being left intact at *D*. Flap *C-E-D* was rotated up into *B-A-F* and sutured in place. *C-D* was cut three weeks after the operation.

Fig. 13.—Complete destruction of the cheek is evident here, *A* and *B*, with loss of anterior wall of maxillary sinus and seventh nerve. *C* and *D* show final appearance.

small defects of the eyelid, making it unnecessary to add tissue from elsewhere. Z-plastics, advancement flaps, mucosal rearrangements, transplants of composite grafts, etc., may be all that are needed.

With regard to nasal losses, many de-

formity varieties are seen. Destructions may involve the ala, the columnella, the nasal tip, the bony architecture, the lining and the general nasal surface. When the skin is replaced by cicatrix and the subjacent architecture is intact, simple removal of the cicatrix alone and a free skin graft from the base of the neck or other areas of comparable facial color may give a satisfactory result. A complication in such a procedure would occur if one found the alar cartilages absent. Skin graft coverage could be satisfactory, but owing to instability of the lateral alar walls caused by cartilage loss, each time the patient inhaled the alar walls would be snapped shut by the sucking intake of air, obstructing inspiration. Treatment for this complication has followed two lines. If the skin graft has been in place for a year, small sections of conchal cartilage have been utilized for stability. These pieces of cartilage are inserted beneath the skin graft in the alar location. However, our best results have come not from this procedure but from laterally insetting the posterior alar borders. This increases the nasal aperture. After the procedure the patient has a somewhat broader nasal base, but this does not spoil his appearance. When only one ala is lost, reconstruction can be carried out by using local skin and flaps or the composite graft from the ear. For

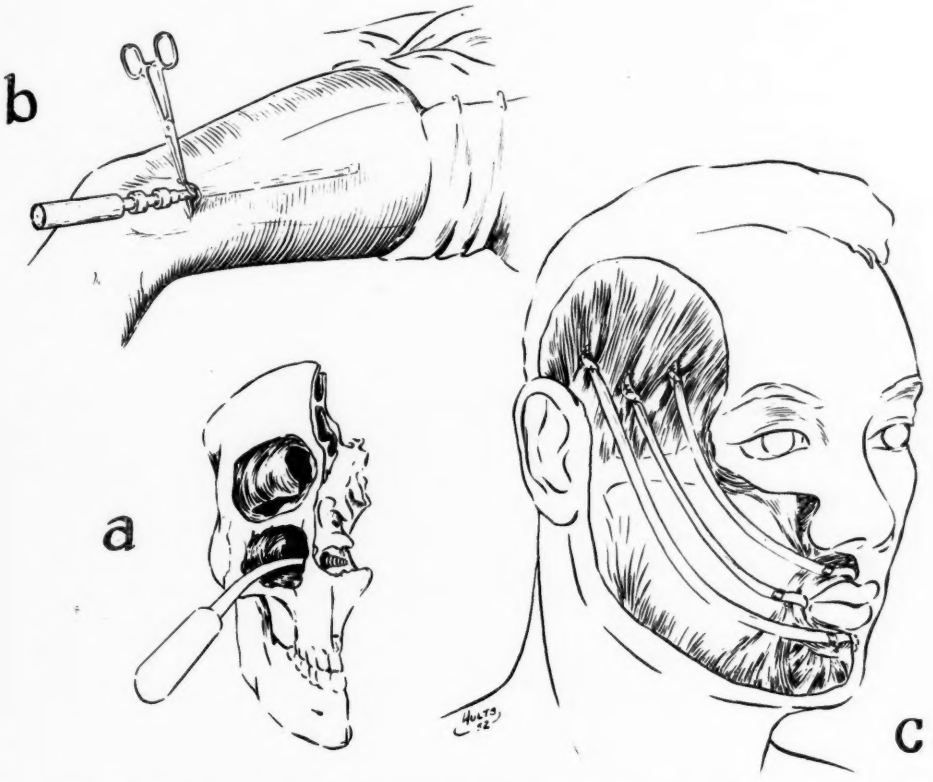

Fig. 14.—A large intra-nasal window was constructed prior to closure of the cheek. *(A)*, Fascia lata from the thigh *(B)*, at a subsequent operation was implanted by Lt. Col. Tenery. This supports the angle of the mouth, giving facial balance *(C)*.

tip losses of any size, ordinarily pedicle flaps or tubes are more satisfactory. In the occasional case one may be able to shift the dorsal skin downward and place a skin graft above in the newly formed site. With this latter method, a satisfactory reconstruction can be accomplished in one operation. Occasionally tip repairs can be had by using free transplants from the ear lobe. It is taken for granted that the internal aspect of the nasal compound will be constructed before definitive surgery is accomplished on the outside; for without the ability to breathe, improved appearance is of no avail. For dislocation of the nasal bones without coverage loss, refracture and repositioning of the septum may provide satisfactory results. The depressed dorsum can be elevated by cartilage or bone transplants. These grafts improve breathing space and appearance at the same time.

Definitive repairs for destructive wounds of the lips are accomplished by rearrangement of local tissue and by addition of tissues from elsewhere in the form of flaps or tubes. Marked upper lip losses may sometimes be replaced by rotating full thickness cheek flaps into the recipient site. When this can be done, a total reconstruction is completed with one operative procedure. When the cheeks are involved with scar destroying the continuity of the adjacent blood supply, reconstruction is best accomplished by using the tube pedicle or flap. These can be built beneath the chin line; they can also be constructed on the chest or the upper part of the arm, or they may be transported to the lip via intermediate carrier. The skin of the neck and upper part of the chest usually matches the color of facial skin much better than skin from other surface locations. It is also possible to utilize the cycle flap with the attached bay of skin, skin-lined, to replace upper lip losses.

In destructive wounds of the lower jaw, soft tissue alone may be lost or there may be destruction of the mandible and oral lining as well. In general, it is necessary to replace soft tissue as a preliminary procedure when the problem is a compound one. Flaps are always employed. They should be large in bulk. After this transplant has grown in place, the reconstruction of the mandible can be accomplished. The third stage deals with intra-oral repair. Likely as not, the buccal or labial sulcus will have been lost in the local area as a result of the original trauma. Careful examination will reveal the extent of injury. Free skin grafts are used intra-orally in the third

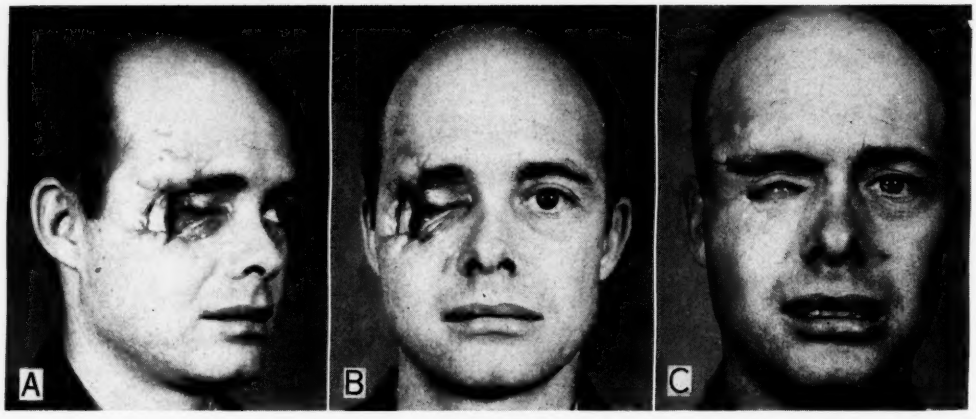

Fig. 15.—*A* and *B* show destruction of eye globe,eyelids, and supraorbital ridge, with exposure of lateral bony orbital rim. *C*, final appearance; a temorary acrylic prosthesis is in place.

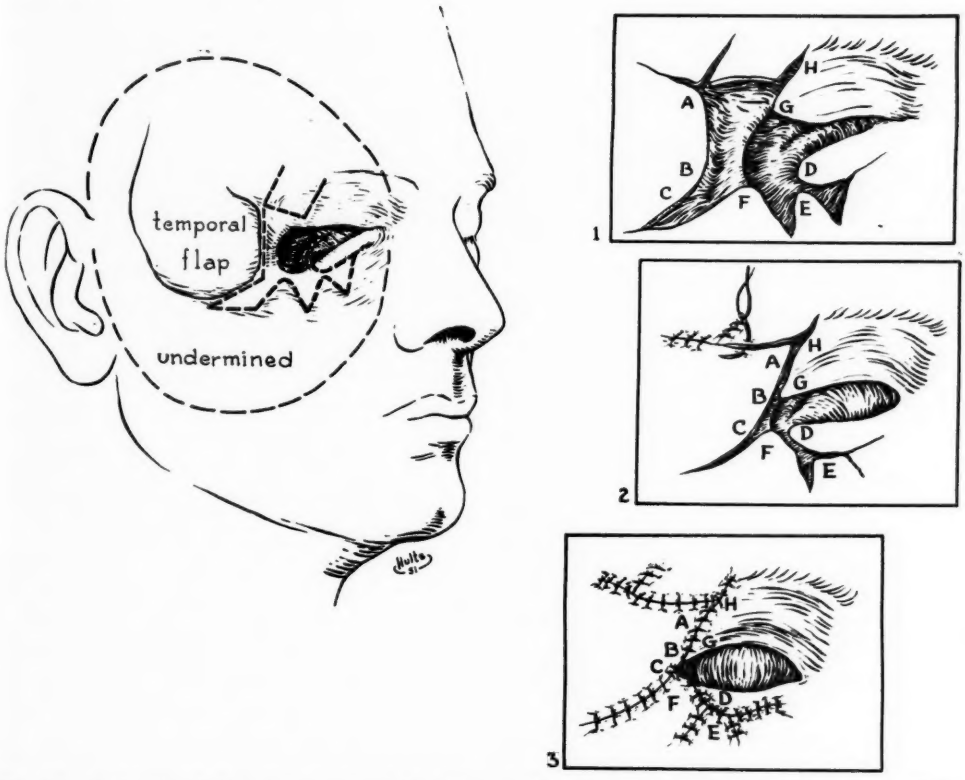

Fig. 16.—A temporal flap was prepared by delay method. Its use replaced bulk tissue loss. Three delays employed prior to migration because of continuity scarring. Technical surgical repair carried through by Major Tumbusch.

stage. These rebuild the sulci so that dentures can be worn. Rotation of intra-oral mucosal flaps has been satisfactorily employed for vermilion reconstructions.

KOREAN CASUALTIES

CASE 1.—A 22-year-old patient (Fig. 11) was admitted to Brooke Army Hospital as a transfer from Tokyo Army Hospital because of a gunshot wound of the face and left shoulder. He stated that while in combat in South Korea he received a gunshot wound of the face from small arms fire on July 10, 1950. He was admitted to Brooke Army Hospital nineteen days later for care and treatment of his wounds.

Physical examination on admission showed the patient to be well developed, well nourished and in no apparent distress. There was a healed scar of the right cheek bending downward to the corner of the mouth and inferiorly to involve a portion of the lower lip. Cicatricial contractions distorted the corner of the mouth. There was loss of approximately one-third of the upper lip. Intra-oral examination revealed loss of substance in the premaxillary area. A bilateral oral antral fistula was present. Pus exuded from each orifice. Examination of the shoulder revealed a healed scar, with no functional disability. The antral disease was treated by the Ear, Nose and Throat Service, with marked improvement, clearing the way for oral antral closure. Prior to this, however, it was felt wise to repair the upper lip, for, once this had been accomplished, access to the palatal

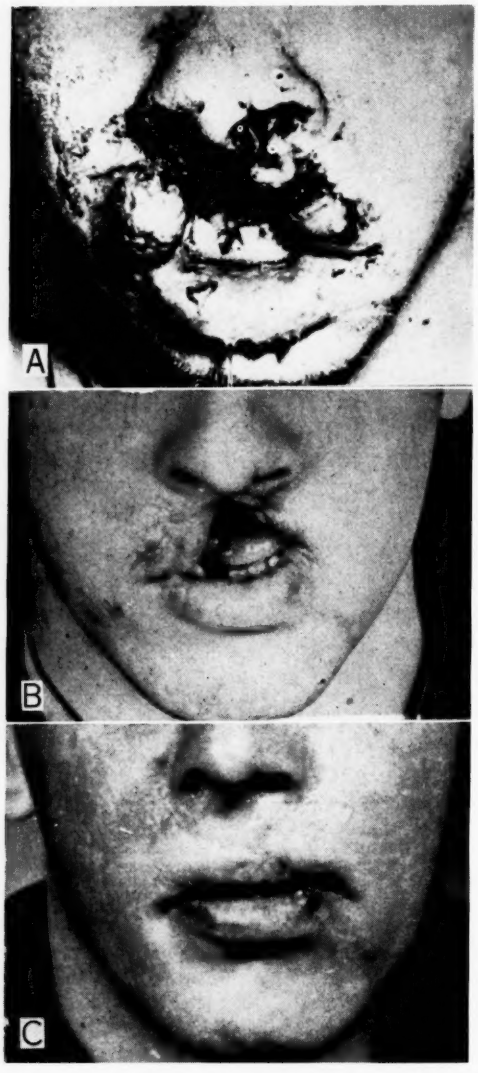

Fig. 17.—Successive stages of wound repair. *A*, initial appearance; *B*, healed wound; *C*, plastic reconstruction completed.

area would be easier. Accordingly, an artery flap was formed on the lower lip and introduced into the recipient site of the upper lip (Fig. 12); this widened the oral aperture and increased the volume and length of the upper lip. After this, an intra-oral skin graft was placed in the upper fornix to extend the ridge. Subsequently, the oral antral fistulas were closed by employing palatal flaps. Healing was good in all areas. The patient was fitted with an upper denture and returned to duty.

CASE 2. — A 23-year-old patient was wounded in action in Korea by shell fragments after only a very short period at the front. He was transferred immediately to the zone of the interior via air evacuation. Examination showed a depressed wound of the cheek which extended posteriorly across the palate to the pterygoid plate (Fig. 13). Some filaments of the second division of the trigeminal nerve seemed to be partially exposed in the roof of the antrum; the facial nerve was involved. The anterior wall of the maxilla was completely destroyed. There was complete loss of sight in the right eye. The cheek wound was treated with saline compresses; antibiotics were administered. It was decided that sufficient cheek tissue was present to effect closure without the addition of a pedicle flap. At operation (Fig. 14) a large intranasal window was established and the adjacent soft tissue structures of the cheek were undermined, permitting soft tissue closure. Subsequently a fascia transplant taken from the thigh was introduced into the facial area, being passed subcutaneously from the temporal muscle to the orbicularis oris. It was fixed well into both of these muscles with sufficient tension to elevate the angle of the mouth. This produced a balanced appearance. The blindness in the right eye was permanent, the result of complete optic atrophy.

CASE 3.—The patient was wounded on Oct. 15, 1951, while in action with the enemy in Korea. He was received at Brooke Army Hospital approximately eighteen days after injury. On admission the patient presented a large orbital defect (Fig. 15), showing a profusely draining sinus, a partial loss of upper and lower eyelids, and an exposed bony orbital rim. The eye globe had been removed elsewhere. Rontgenograms revealed multiple foreign bodies deep within the orbit, and one large mass of metal measuring approximately 1 cm. in diameter lying just subjacent to the conjunctiva at the base of the defect. After removal of this foreign body, the wound closed. The cortex of the orbital rim was sequestrated. This was replaced by granulation tissue. The wound healed by cicatrix. A temporal flap (Fig. 16), was outlined in preparation for reconstruction of the soft tissues. This flap was delayed three times

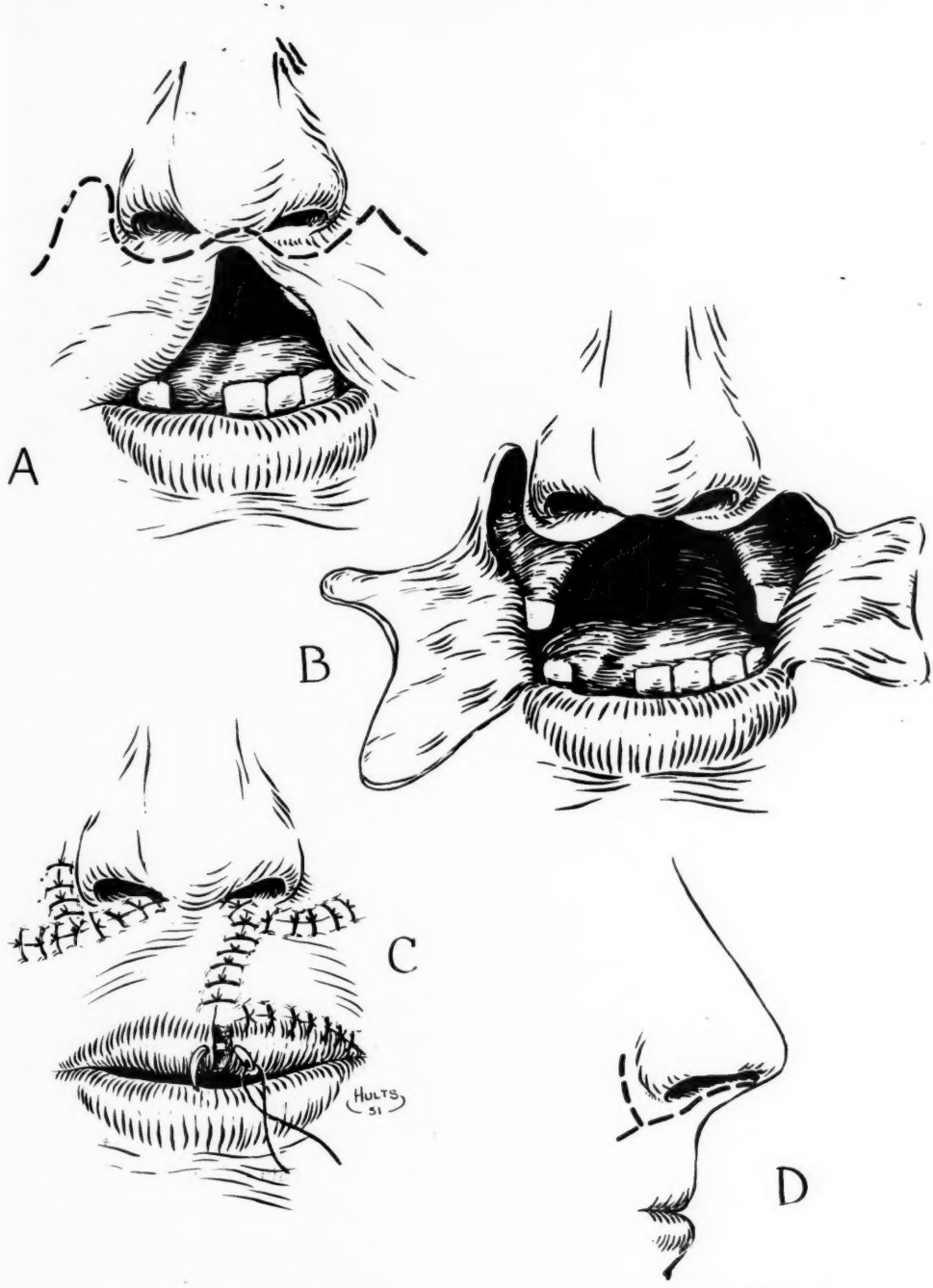

Fig. 18.—Surgical procedure followed: *A*, lateral flaps outlined; note lateral prolongation at alar border. *B*, flaps completely mobilized, ready for medial advancement and closure shown in *C*. Prolongated flap in *A* surfaces columella *D*. Vermilion border in *C* formed by advancement of oral mucosa.

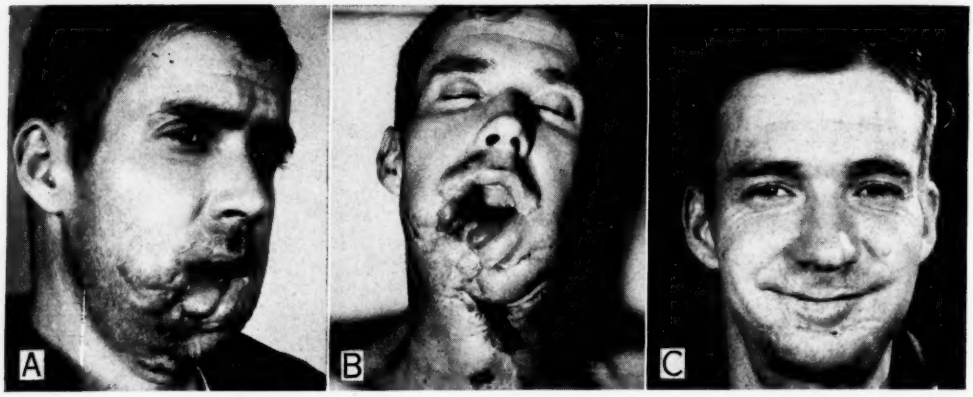

Fig. 19.—Compound defect of the lower jaw, with loss of soft tissue, floor of mouth and mandible (*A* and *B*). *C* shows soft tissue repair, the result of the first operation.

prior to migration. This was necessary because of multiple small scarred areas within the flap continuity. The curved temporal flap was elevated and rotated medially to form the lateral one-third of the eyelid. Excision of adjacent dense scar tissue and liberal undermining permitted the soft tissue of the cheek to be advanced superiorly to form the outer one-third of the lower eyelid. The conjunctiva was undermined and migrated laterally to join the temporal flap of the upper lid and the local flap of the lower lid. An acrylic conformer was left in place.

CASE 4.—The patient sustained complete avulsion of the upper lip (Fig. 17). He was returned to the zone of the interior and treated conservatively until healing had occurred. Six months subsequent to this, a plan of procedure was devised that would largely remedy the defect in one operation. At operation, two lateral cheek flaps were prepared (Fig. 18). These were rotated medially and downward and approximated in the midline. Since it was apparent that the soft tissue in the columnella had been lost and was replaced by cicatrix, we decided that, if a tongue of tissue could be included with one of the lateral cheek flaps, this could be employed to cover the columella as well. Freedom from flap mobilization was accomplished by separating the mucosa from the anterior wall of the maxilla. The vermilion border was reconstructed on the left by migrating oral mucosa around the raw surface border. Undermining permitted the mobilization of the mucosa downward, forward and upward. A small portion of skin was cut away to allow external elevation of the mucosal border. This gave an appearance similar to the vermilion border on the corresponding side. Subcutaneous and cutaneous sutures were used for proximation.

CASE 5.—The patient sustained his wounds while in action in Korea. On admission to Brooke Army Hospital he presented a compound defect of the lower jaw. Examination showed loss of the mandible from angle area to angle area, with destruction of the continuity of the lower lip and also the floor of the mouth (Fig. 19). This was associated with a rather large soft tissue defect of the neck. Before return to the zone of the interior, interdental wiring was employed to fix the remaining fragments of mandible. Gastrostomy was performed for feeding purposes. Shortly after admission, the gastrostomy tube was removed and the area closed. Feeding was maintained by the oral route. Sufficient time was allowed for softening of the scarred areas before plastic surgical repair was undertaken. At the first operation the patient was made water-tight (Fig. 20). Incisions were carried through the remaining structures of the chin and vermilion borders to prepare two lateral flaps. These were interdigitated to give height as well as closure. The vermilion border of the lip was approximated by the Z-plasty technic. The second operation consisted of further freeing the tongue. The addition of a skin graft was necessary to cover the raw surface. A bone graft to the mandible and subsequent intra-

oral skin graft for ridge construction will complete the restoration.

SUMMARY

A procedure plan for early care of the face and jaw wound has been presented and successful methods of definitive plastic surgery described. Surgical achievements in the repair of Korean casualty facial wounds are shown.

ZUSAMMENFASSUNG

Es wird ein Behandlungsplan zur fruehzeitigen Versorgung von Gesichts-und Kieferwunden vorgelegt, und erfolgreiche Methoden endgueltiger plastischer

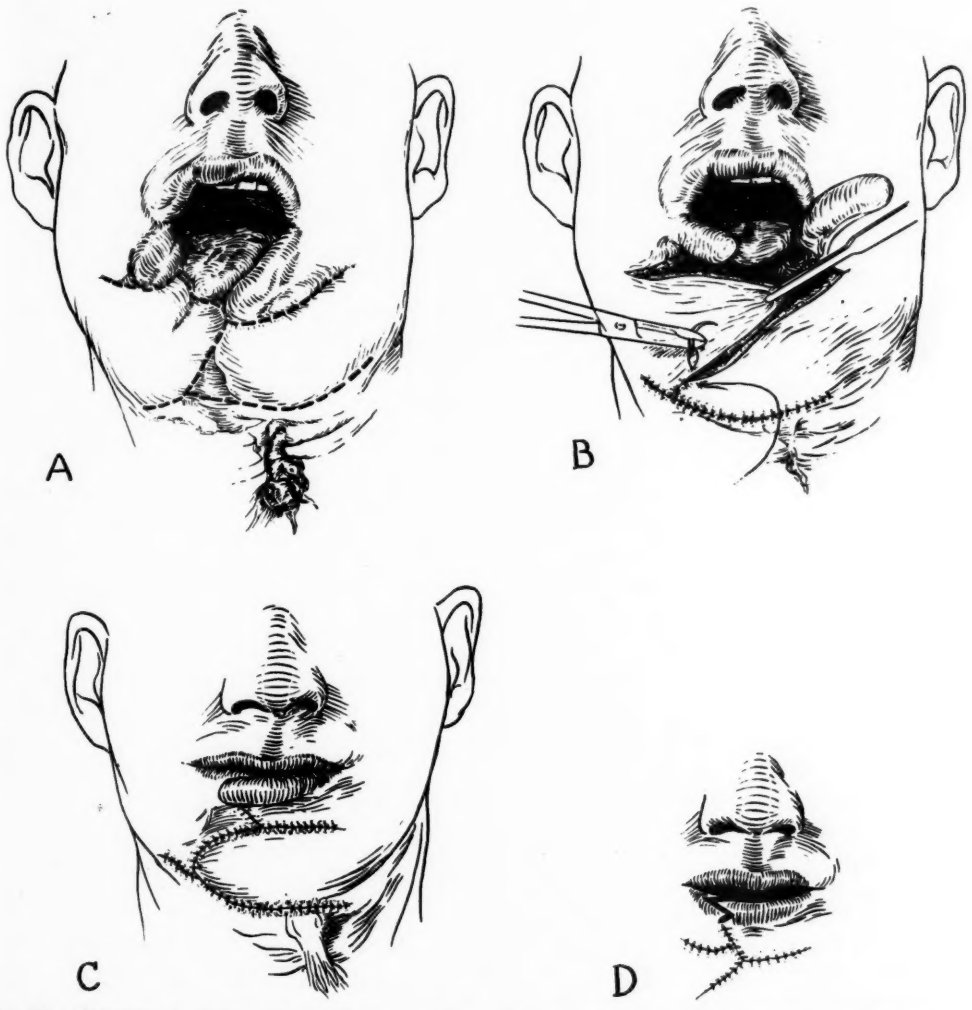

Fig. 20.—Diagram *A* shows flap outlines to obtain closure and vertical height. Closure begun in *B* and *C*. *D* illustrates detail of lip closure. A modified Z-plasty was used for the vermilion border.

Chirurgie werden beschrieben. Chirurgische Erfolge in der Wiederherstellung von Gesichtswunden bei Kriegsverletzten aus Korea werden gezeigt.

SUMARIO

Um plano de processos para cuidados de emergencia em feridas da face e do queixo foi apresentado e metodos coroados de sucesso de cirurgia plastica definitiva foram descritos. Acabamentos cirurgicos na reparação de ferimentos faciais de destastres na Korea são demonstrados.

RESUMEN

Se presenta un procedimiento para atención temprana de herida facial y maxilar. Se describen métodos satisfactorios de cirugía plástica definida. Se consignan mejoramientos quirúrgicos en la reparación de heridas faciales accidentales en Corea.

RIASSUNTO

Viene presentato uno schema di terapia precoce per le ferite della faccia e della guancia ed un metodo efficace di chirurgia plastica definitiva. Vengono presentati i risultati della terapia chirurgica di ferite facciali in Corea.

RÉSUMÉ

L'auteur établit une ligne de conduite pour la cure chirurgicale à l'aide de la plastie des plaies de la face et de la machoire. On mòntre les résultats obtenus par la chirurgie plastique des blessés de la guerre de Corée.

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Correction

We regret to announce that, owing to an error in printing or make-up, a line was misplaced in the article "Additional Lesions Simulating Protruded Intervertebral Disc" by Dr. H. Herman Young, F.A.C.S., of the Mayo Clinic, which appeared in our June 1952 issue. On Page 832, the last line of the first column should be read as the last line of the second column. The Journal offers sincere apologies to Dr. Young and to all readers who may have been inconvenienced by this error.

Treatment of All Fractures of the Femoral Neck and Trochanteric Region with the Original One-Piece Flanged Nail

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IN 1950 the senior author presented a series of 14 patients with subcapital and transcervical fractures of the hip treated with the one-piece flanged hip nail. The main purpose of this paper is to present these and other similar cases in the light of further follow-ups. It should be reiterated, however, that internal fixation of these fractures in elderly patients is the treatment of choice, for reasons that will be mentioned later. Subtrochanteric and upper shaft fractures of the femur will be mentioned later, as well as a new prosthetic device for use with the one-piece flanged nail.

The evolutionary steps leading to present-day treatment of the fractured neck of the femur have been thoroughly described and discussed in many papers during the past ten years. The tremendous importance of the Smith-Peterson nail, which revolutionized the treatment of this perplexing fracture, cannot be overstressed. The incorporation of the central hole in the nail for the guide wire, which was Johannson's contribution, was another improvement. The next noteworthy advance, in our estimation, was made by Thornton, who added the flange down the shaft of the femur, the latter being attached to the Smith-Peterson nailhead with a threaded bolt. This enabled the trochanteric fractures to be treated, to a greater or less degree, as fractures of the femoral neck, and eliminated for many patients the necessity for plaster spicas or having to lie in bed in traction for many weeks. The senior author was the originator of the first one-piece flanged hip nail, which he described in *The Bone and Joint Journal* of October 1941. The other one-piece nail appliances all came after the article was published. The adjustable nail-flange appliances have certain advantages but also definite disadvantages which, in our opinion, outweigh their good points.

It is not our intention in this paper to review the tremendous mass of information as to methods of treatment, both good and bad, for fractures of the hip region. This has been one of the most discussed of all fractures and even now, after the passing of many years, has failed to evoke any unanimity of opinion concerning treatment. In the last few years a great many authors have written about the problem of subcapital and transcervical fractures of the hip, discussing a great range of operative measures and describing a great many internal fixation devices. The confusion prevailing today is exemplified by the fact that each of many surgeons has designed, used and recommended his own variation of wire, pin, screw or gadget for mantaining good position after reduction of a fracture of the femoral neck. The average incidence of union resulting from all methods of internal fixation has been about 70 per cent. We are strongly of the opinion,

Read at the Sixteenth Annual Congress of the United States and Canadian Sections. International College of Surgeons, Chicago, Sept. 10, 1951.
Submitted for publication July 11, 1952.

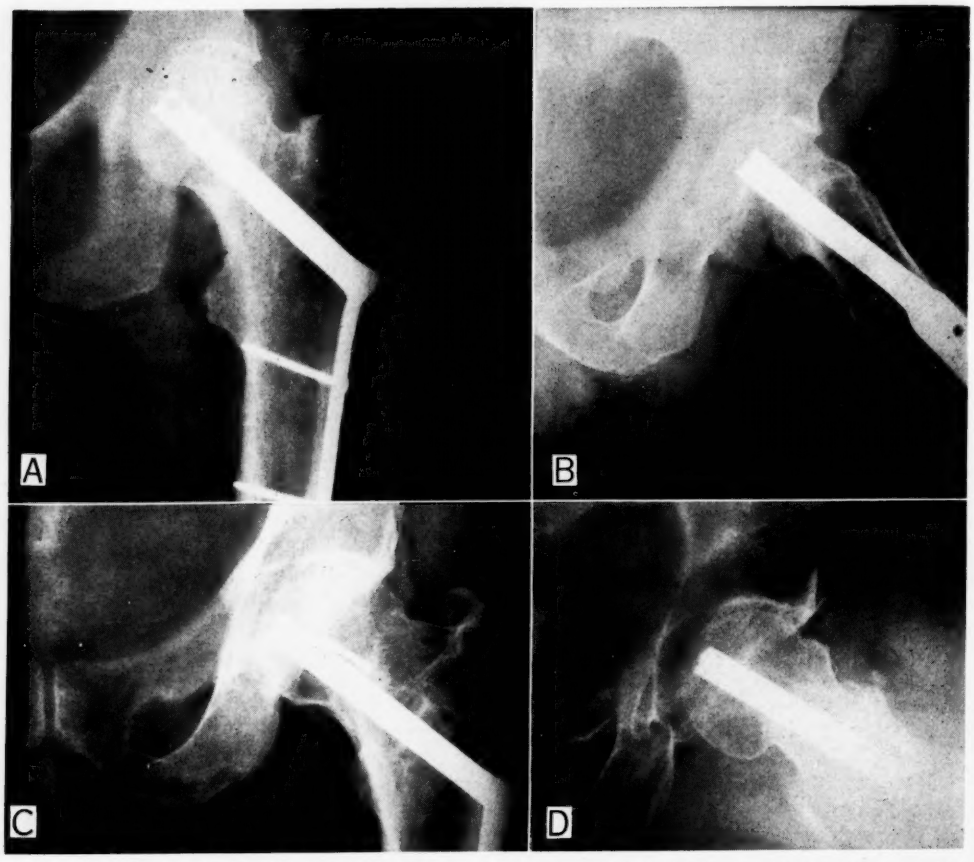

Fig. 1.—*A* and *B*, displaced subcapital fracture (case of L.D.B.). Follow-up forty-eight months. Last roentgenogram taken thirty-eight months after the operation. Excellent result. *C* and *D*, displaced subcapital fracture (case of R.H). Follow-up forty-eight months. Last roentgenogram taken forty months after the operation. Excellent result.

however, that the three-flanged nail is the best internal fixation device for the neck and head of the femur, especially when it is anchored to the shaft of the femur by the rigid flange and screws.

Pauwels' classification has aided a great deal in clearly describing the different types of fractures of the femoral neck and explaining to some degree the reasons for the different results obtained with each type. Of course, the main principles involved were understood many years ago by orthopedic and traumatic surgeons, who knew full well that the more nearly vertical the type of fracture the less chance there was of obtaining satisfactory union. Conversely, the more nearly parallel the fracture to the horizontal plane the better the result, as a general rule.

In the October 1950 issue of the *Journal of the International College of Surgeons* the senior author described a new approach to the treatment of subcapital and transcervical fractures of the hip in which he advocated the use of his nail for these types of fractures as well as for the trochanteric types. We believe that to simplify the operative procedures so that one

type of nail can be used for all fractures involving either the head, the neck or the trochanteric region would be a great advance and would make it much easier for the general surgeon, who nails an occasional hip, to take care of his patients when these injuries occur. A very small percentage of fractured hips can be operated on by surgeons who have had enough experience in this field and who have the equipment and personnel available to do a combined nailing and bone graft, or an osteotomy procedure.

Before going into an analysis of these results, a few general statements and conclusions from our experience in treatment of hip fractures are in order: The hip nailing operation is not as easy as it seems and calls for a considerable amount of skill and judgment. This procedure demands adequate roentgen equipment and technicians and should be done only when conditions are favorable. Experience gained from the treatment of our patients leads us to believe that patients with hip fractures generally should not be treated as emergency patients. We prefer to have our patients in the hospital

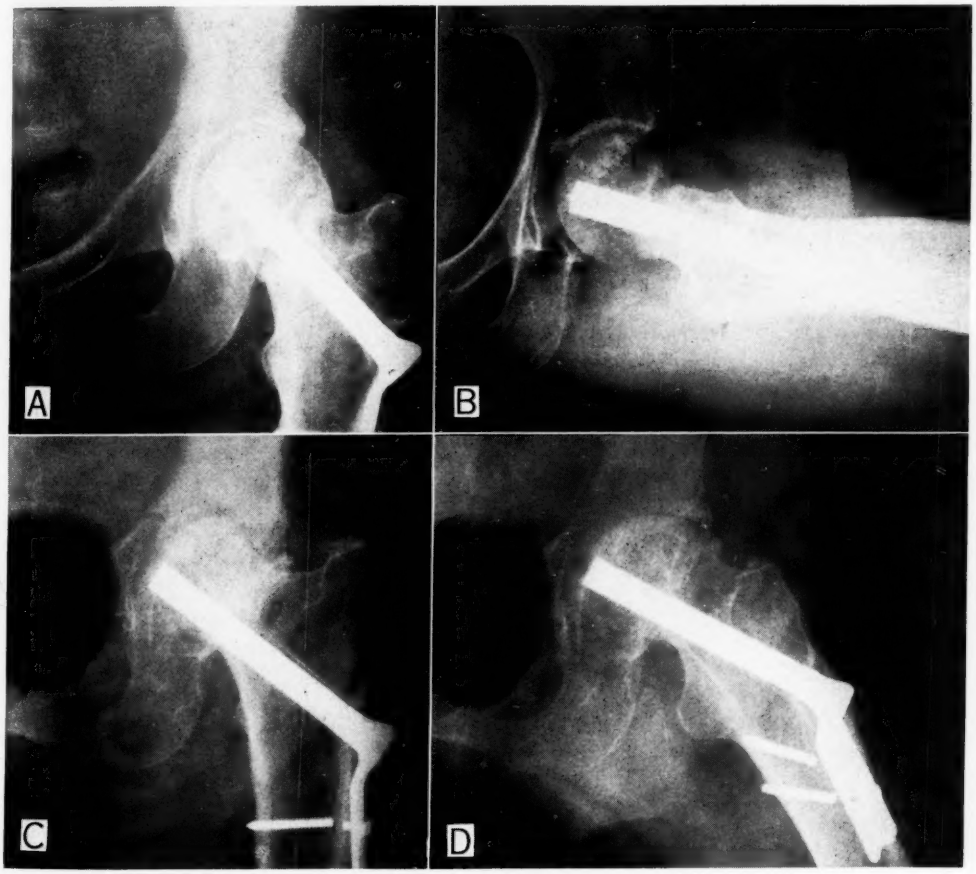

Fig. 2.—*A* and *B*, displaced subcapital fracture (case of G.O.). Follow-up twenty-one months. Excellent result. *C* and *D*, displaced subcapital fracture (case of J.S.). Follow-up thirty-one months. Last roentgenogram taken thirty months after the operation. Excellent clinical result. Better than roentgen appearance. Screws broke during healing period.

for a few days in Buck's extension 10 to 12 pounds (4.5 to 5.4 Kg.), during which time they are thoroughly "worked up" from a medical as well as a surgical standpoint. Owing to the extremely advanced age of many of our patients, we secure the services of an internist (preferably one thoroughly trained in geriatrics); any deficiencies in vitamins, hormones or fluid balance are thoroughly investigated, and means for their correction are instituted. Many patients who have hip fractures are anemic, and for these blood transfusions and adequate diets and medications are important. This plan of close cooperation with the internist is especially commendable, as some of these patients, according to our medical colleagues, have slight cerebral vascular accidents which lead to their falling in the first place. A thorough medical check-up and evaluation will often prevent embarrassment later, when the patients are convalescent and have recurrent cerebral accidents or other undesirable complications.

For reduction of the fracture we usually use the Ledbetter maneuver and employ his test. Reduction is checked with anteroposterior and lateral roentgenograms.

Fig. 3.—*A* and *B*, displaced subcapital fracture (case of B.R.). Follow-up twenty-one months. Excellent result. *C* and *D*, displaced subcapital fracture (case of B.M.). Follow-up twenty-four months. Last roentgenogram taken twenty-one months after the operation. Excellent result.

Fig. 4.—*A* and *B*, displaced subcapital fracture (case of K.G.). Follow-up thirty-six months. Excellent result. *C* and *D*, displaced subcapital fracture (case of W.M.). Follow-up forty-seven months. Last roentgenogram fifteen months after the operation. Good result.

However, in many cases of trochanteric fracture the traction in bed with the limb abducted and internally rotated results in a perfect reduction, which is maintained by the traction until after the patient is placed on the operating table. For continual maintenance of the position of internal rotation, abduction and flexion of the knee we sometimes have a nurse or an attendant hold the limb in this position at the side of the operating table. At other times we have used a traction apparatus with a boot and a weight hanging over the end of the table. Because of the necessity of doing this operation in many hospitals that do not have orthopedic tables, we have discontinued the use of such tables for this purpose. A more recent method, which we have used in outlying small communities where adequate help is not available, is to hold the internally rotated limb in the correct position, with a pillow under the moderately flexed knee, by adhesive tape, which is placed around the ankle and the foot and then fastened to the understructure of the table. This is put on so that the leg is held in adequate internal rotation.

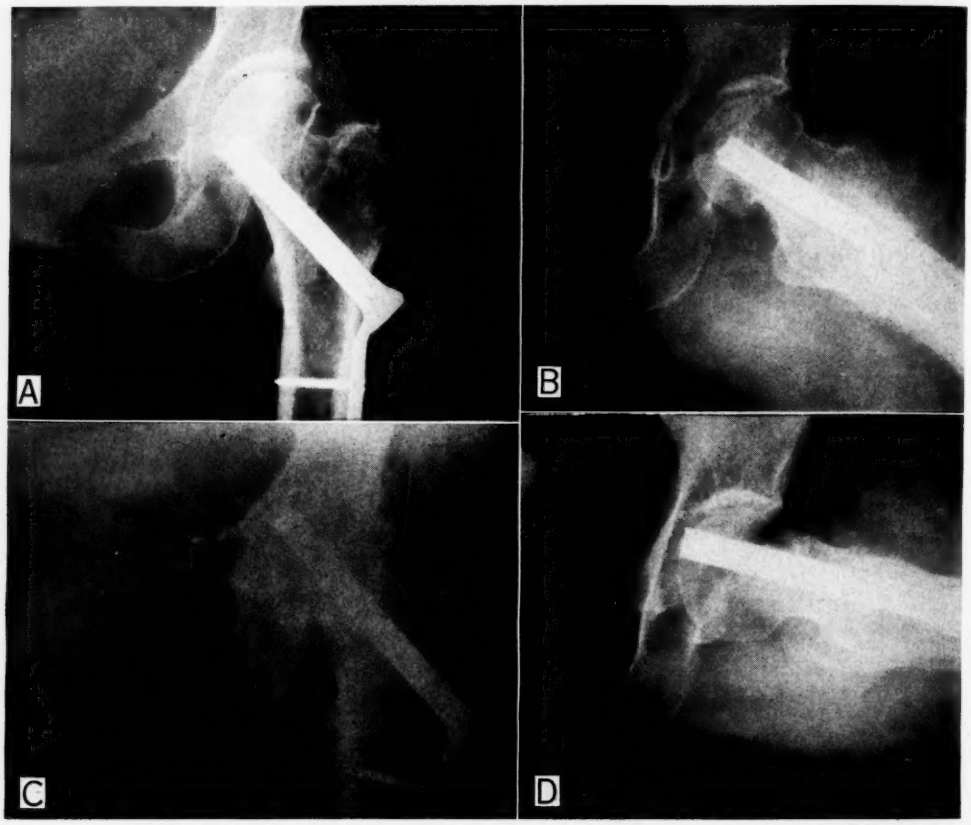

Fig. 5.—*A* and *B*, displaced subcapital fracture (case of O.H.). Follow-up twenty months. Excellent result. *C* and *D*, displaced subcapital fracture (case of J.S.). Follow-up forty-eight months. Excellent result.

If care is taken in putting the tape around the ankle, no circulatory damage will be done. A little padding may be placed over the dorsum of the ankle underneath the tape, if so desired. The leg should be brought up on the table as soon as the nail and one or two of the screws are in place.

Our choice of anesthesia varies with the individual patient, but we most frequently use local procaine hydrochloride anesthesia combined with a minimum of intravenous pentothal sodium and nitrous oxide and oxygen. Spinal anesthesia is rarely used, and we seldom use ether. Before the war we used rectal avertin and gas oxygen a great deal, but since the advent of pentothal sodium we have used the latter almost entirely. At times very good local anesthesia can be obtained at the fracture site by inserting procaine hydrochloride through one of the guide-wire holes.

The positioning of the nail in relation to the neck and head is important. In our opinion the best position lies in the inferior and posterior portion of the neck, the nail being as nearly perpendicular to the fracture line as possible. However, we are of the opinion that the markedly oblique nails go more up into the weight-bearing area of the head and that

this is undesirable because, with the absorption of the neck at the fracture site, eventual protrusion of the nail into the acetabulum in this vulnerable region is often observed. As has been pointed out previously, this protrusion of the nail into the acetabulum is not in itself totally undesirable, as little or no damage results if the weight-bearing surfaces of the head and acetabulum are not invaded.

Although there are excellent devices for directing the guide pin for the nail, it is our practice to put in at the base of the greater trochanter three guide wires at different angles and at slightly different obliquities with respect to each other in both planes. A roentgenographic check on the position of these three guide wires gives us satisfactory information for insertion of the nail at the right angle and in the right plane. When the correct guide wire is determined, the length of the desired nail is easily obtained by comparing the roentgenograms with the wires *in situ*.

The calibrated guide wire is a menace, as every now and then the leading edge of the nail catches on one of the grooves and the wire becomes bent or broken or pushed on into the acetabulum or the

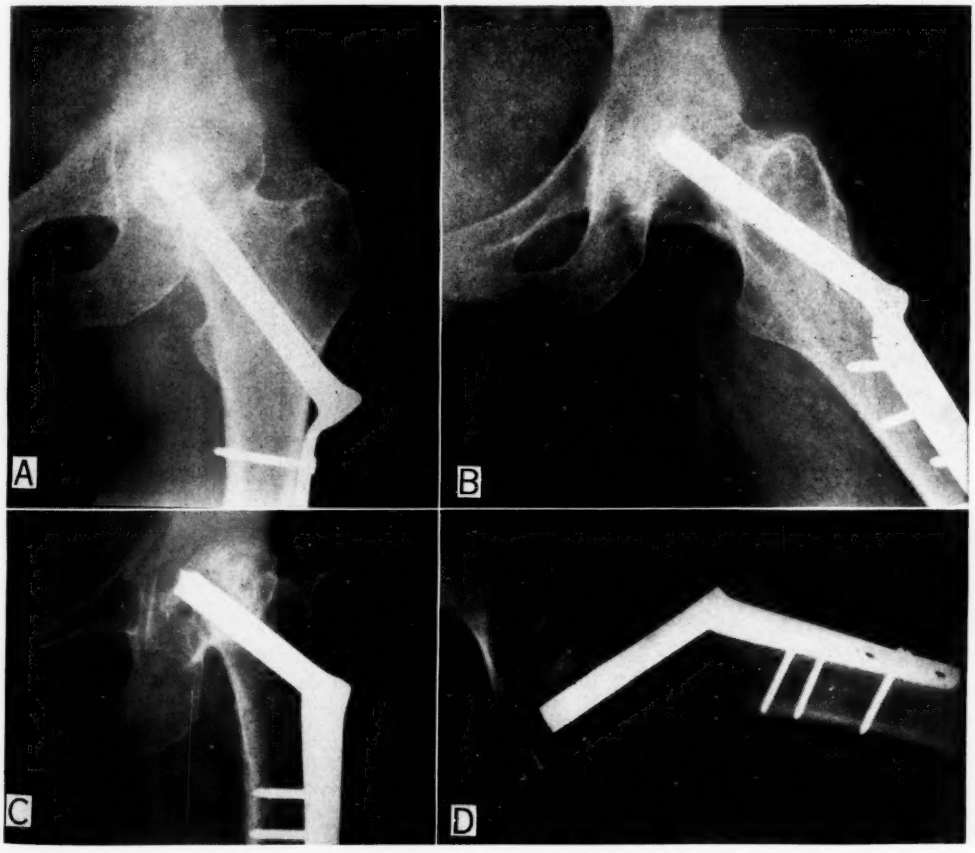

Fig. 6.—A and B, displaced subcapital fracture (case of M.P.). Follow-up twenty months. Excellent result. *C* and *D*, displaced subcapital fracture (case of I.D.). Follow-up twenty-nine months. Nail protrudes slightly but no crepitus or pain; some limitation of motion. Good result.

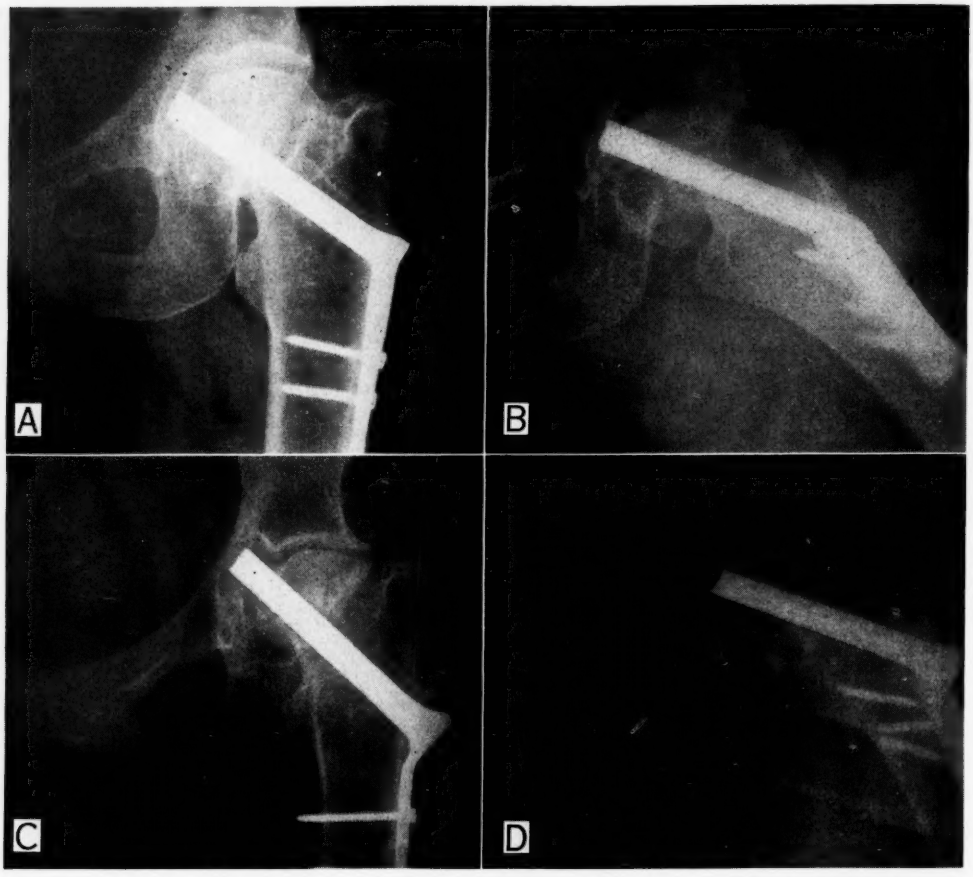

Fig. 7.—*A* and *B*, displaced subcapital fracture. Follow-up forty-four months. Last roentgenogram forty months after the operation. Nail protrudes, but patient has good range of motion. Has some limp, but is well satisfied. Good result. *C* and *D*, displaced subcapital fracture (case of W.B.N.). Follow-up twenty-five months. Marked protrusion of nail with excavation of acetabulum. Patient gets about on crutches and has no pain. Sleeps well. Refuses to have nail removed. Poor result.

pelvis. If this is suspected, while the nail is being driven in, even with the smooth wire, the driver is removed to determine whether the guide wire has been driven inward or not.

Before driving in the nail we always anchor the proximal head fragment with two or more guide wires, so placed that they effectively help to prevent rotation of the head fragment as the nail is inserted. Of course, they must not be in the way of the nail. We use the reamer to prevent shattering the bone.

These nails can be bent with angle-irons and a holding device so that an accurate angle can be obtained between the flange and the nail end. If the aforementioned nail guide and flange adjustment is not used, it is a good plan to measure the distance from the flange to the shaft of the femur when the two are lying parallel. If there is any discrepancy always adjust it so that the flange is parallel or in a slightly valgus position as

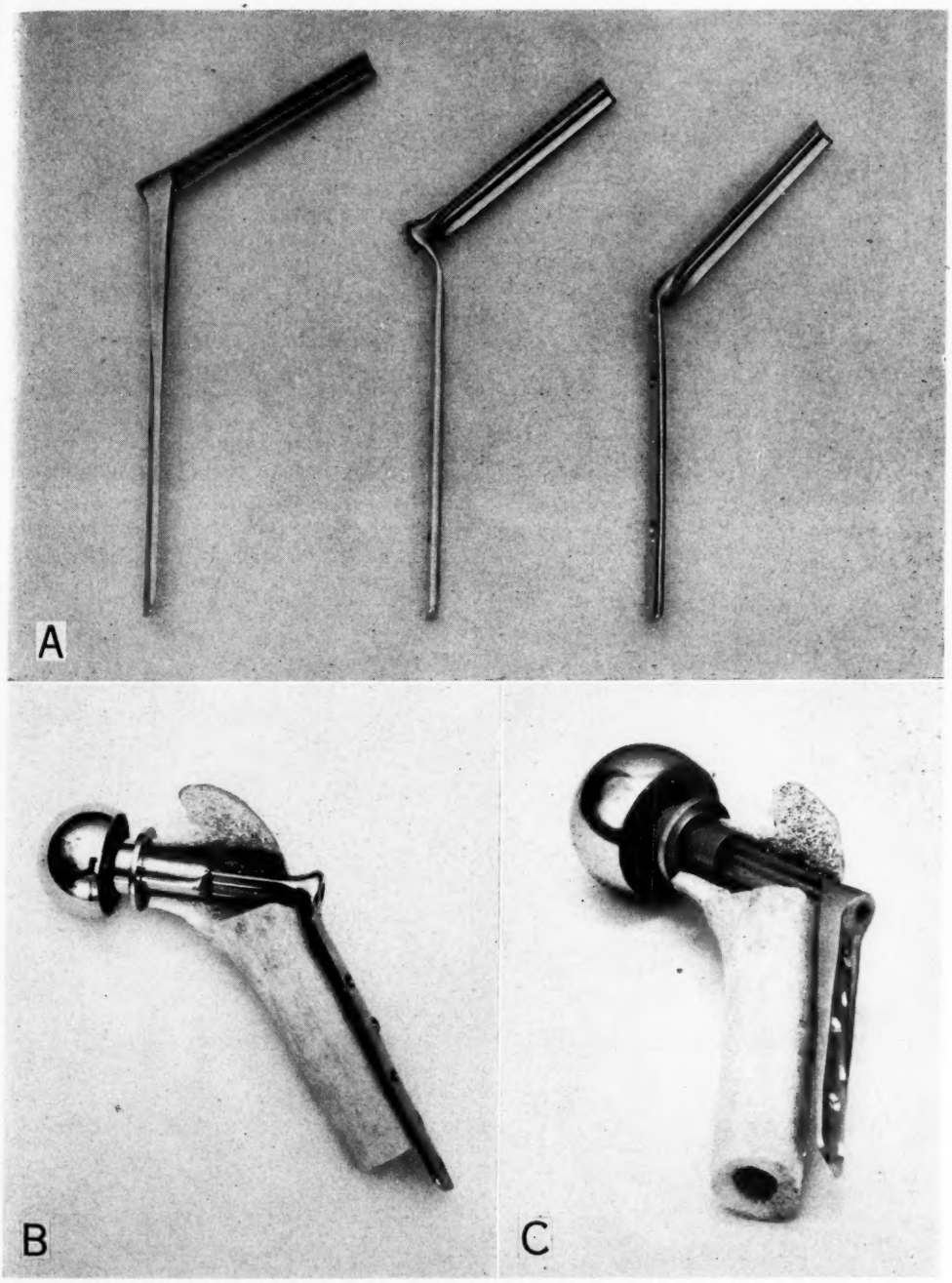

Fig. 8.—Stainless steel and vitallium prostheses, collars, and Jewett nail of similar metal. The small lugs gauge the distance from the triflanged end of the nail and the internal end of the prothesis not shown.

regards the shaft. In other words, when the flange is driven down in apposition to the shaft of the femur, always be sure that it lies flat on the shaft or with its distal end a little away from the shaft, so that when this is tightened down it will tend to produce a slight valgus fracture site in place of a varus. It is relatively easy to put a bone clamp around the shaft of the femur and the flange of the nail and tighten it up, after which the screws are put in to fasten the flange to the shaft. Of course, if the flange fits snugly on the shaft after the nail is inserted, there is no need to put a bone clamp on.

One point about the trochanteric fracture. Always be careful in driving in the nail not to put it in too far or with too much force, as this may result in the shaft being moved medially on the proximal fragment and the nail going on through the head.

For the subcapital and transcervical fractures we originally used a short flange with only two screws, but now we prefer to have at least three screws in a flange measuring 2 inches (5 cm.) or more. Even better is a 5-inch (12.5 cm.) flange with four to six screws. Even with three screws in place there have been nails that have either pulled the flange away from the shaft or have had the screws break.

It is impossible to be absolutely certain that a patient walking with a walker or crutches does not slip and put more

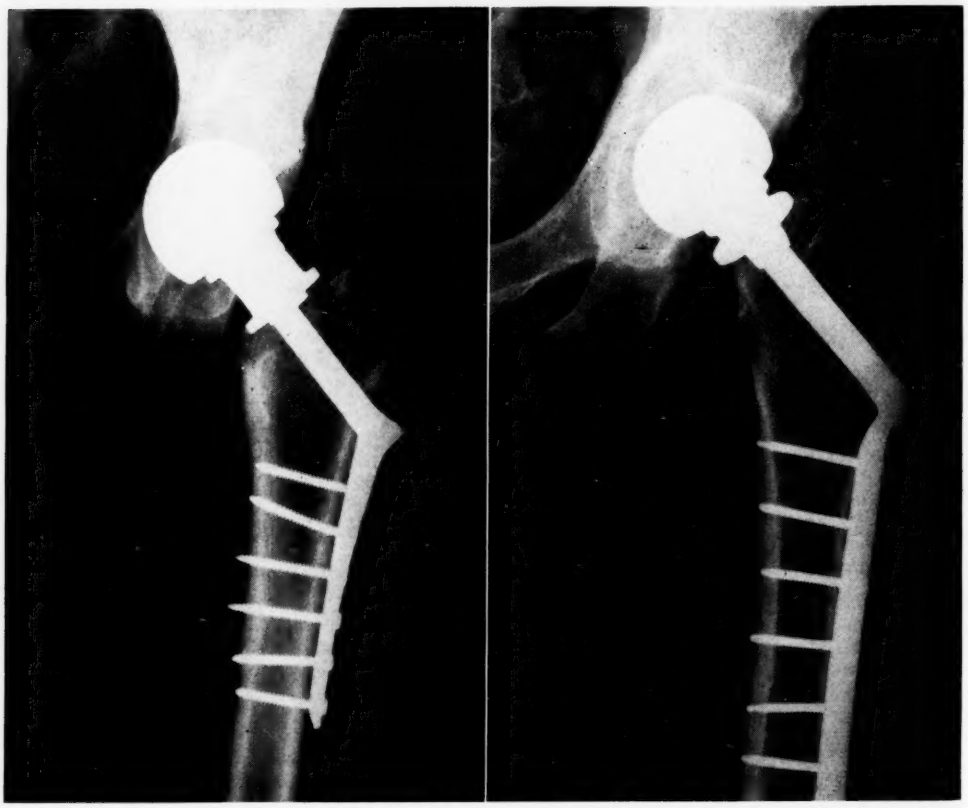

Fig. 9.—Vitallium prosthesis and nail (left) and stainless steel prosthesis and nail (right), both *in situ*, with good mobility and range of motion. Good prognosis, but too early to give final result.

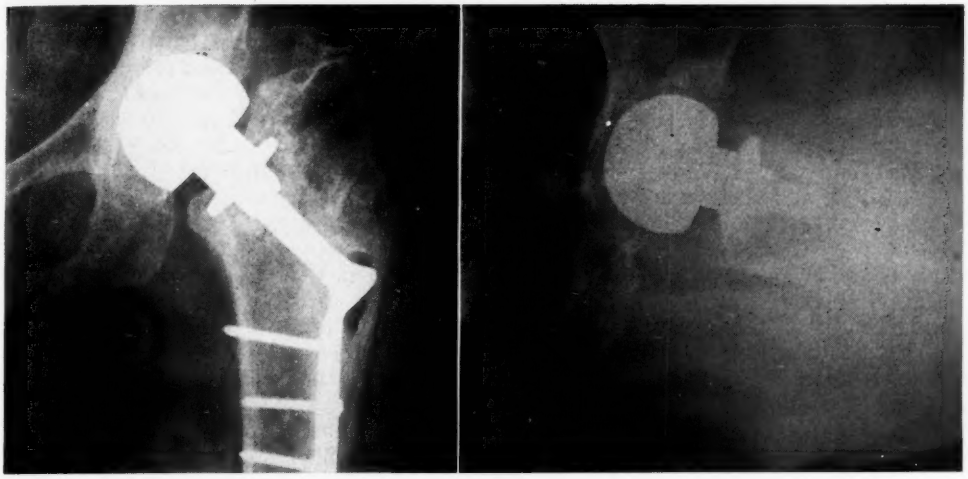

Fig. 10.—Old displaced subcapital fracture with necrosis. Two previous operations and now, six months after the operation, "prosthesis". Excellent mobility of joint. Patient walks with a walker. Has some pain but is gradually improving.

weight on that limb than is safe. We believe in moderate impaction of the fragments without too much or too long continued pounding.

No hip can be considered adequately internally fixed until satisfactory anterior-posterior and lateral roentgen views have been taken and have proved without doubt that the fixation material is well centered and of proper depth, and that no twisting or angulation of the head has occurred.

In suturing the wound we use No. 00 running chromic catgut for the muscle layer and another similar suture for the tensor fascia lata, No. 00 running plain catgut for the subcutaneous tissues, and skin sutures of cotton or silk. No drains are used.

With regard to postoperative care, we have the patient move all the uninvolved joints and encourage deep breathing exercises every hour. We put our patients in Fowler's position as soon as they have recovered from the anesthetic. Otherwise their immediate care is that of any surgical patient. We get them up in a wheelchair in a day or two, if posssible, and start them walking without weight-bearing within a week and a half if there is no contraindication. We do not allow full weight-bearing on that limb for four to six months or until clinical examination and roentgenograms indicate solid union. Little, if any, callus occurs, and the extent of bone union can be judged only by the obliteration of the fracture line and the appearance of bone trabeculations across it. Generally all hip fractures have absorption in the quadrilateral space of the neck, which leads to shortening of the neck as healing progresses. We disagree profoundly with the concept that, if there is absorption of the neck, nonunion will result. Also, angulation of the head of the femur on the neck anteriorly does not necessarily lead to nonunion. Also, as has been stated in an earlier article by one of us, the presence of the "beak" likewise does not preclude a satisfactory result.

Routinely, we employ penicillin postoperatively for at least a few days or until the temperature has been flat for forty-eight hours. Along with penicillin we use benadryl or some other antihistamine drug in adequate doses, three or four times a day, in order to prevent or

tend to prevent allergic reactions to the penicillin. Benadryl also reduces muscle spasm and has a moderate sedative effect on the patient. Since we have employed these measures routinely in all bone and joint operations in the past four years, we have had only 2 cutaneous reactions to penicillin, and these were of no great consequence. Over 1,800 operative cases have been so managed in this space of time. Benadryl is continued for forty-eight hours after the penicillin has been discontinued. Of course, at the first sign of any cutaneous or other allergic reaction we stop the penicillin at once.

In the past six years we have operated on 322 patients with fractures of the hip, which include subcapital, transcervical, paratrochanteric, pertrochanteric, intertrochanteric and subtrochanteric types. In the years just after the second World War we used the Smith-Peterson nail for subcapital and transcervical fractures of the femur. Fifty-six patients of this group were treated with the Smith-Peterson nail and are not included in the present series. Of the 322 patients, therefore, 266 patients with the aforementioned types of fracture were treated with the Jewett Nail. The average age of these 266 patients was 70 years. There were 197 female and 169 male patients, the oldest patient being 97 years of age and the youngest 18. Of the 266 aforementioned hip fractures there were 95 subcapital and transcervical fractures. Of these, 65 have been followed for six months or longer. The average duration of follow-up for these 65 is twenty-four months. The first of these 65 patients treated with the Jewett nail was operated upon on Nov. 20, 1946, and the latest one on Jan. 30, 1952.

We are definitely of the opinion that this idea of using a universal one-piece flanged hip nail for all fractures involving the hip and the trochanteric area is well worth further trial. We believe that our results are better than any we have obtained with the Smith-Peterson nail or any other fixation device. In our opinion, this is a better method of treatment than has been presented in any similar series of cases reported in the literature. We have leaned over backward to be fair in our appraisal of these patients and their results, and we are keeping a detailed record of each and every patient, so that later we may obtain further follow-up studies on as many as possible.

With regard to the use of the two-flanged nail of the senior author, which he described in a recent article in the *American Journal of Surgery* (February 1951), some further observations can be added now. Since the original article, we have had 6 more patients so treated, making a total of 12. One of these patients died; one had to be reoperated on, and 1 had a nail put in for a metastatic cancer of the upper end of the femur. The last-mentioned patient has been living now for thirteen months with a tumor of increasing size in her abdomen, with further invasion of the femur by this metastatic growth. The dual-flanged nail, however, has bridged this large, almost complete gap in the femoral neck and trochanter for a distance of three inches (7.5 cm.) or more. The patient is ambulatory without need of plaster or brace, but with crutches and very limited weight-bearing. The other patients have all done remarkably well, and we feel that this is definite progress in the successful treatment of this troublesome type of fracture.

In the realm of new prosthetic devices

*Results are indicated in table (opposite) as follows: *Excellent:* Patient is walking without support and without pain and is well pleased with the result of the operation. *Good:* Patient has some pain or limp and some need of occasional support. *Fair:* Patient has union but pain persist and mild support is required. *Poor:* Patient has nonunion of fracture or aseptic necrosis of the head of the femur. Poor surgical and clinical result.

Of the total series of 65 fractures, excellent results were recorded for 38, or 58.2 per cent; good results, for 14, or 21.7 per cent; fair results, for 3, or 4.7 per cent, and poor results for 10, or 15.4 per cent. Fourteen, or 21.5 per cent, of the patients were male; 51, or 78.5 per cent, were female. The oldest patient was 93 years of age and the youngest 38. The average age was 71.

*Follow-Up of Sixty-Five Subcapital and Transcervical Fractures of the Hip**

Patient	Follow-Up, Months	Result	Date of Operation	Complications
A.A.	24	Excellent	1-24-50	
C.A.	8	Good	12-11-48	Nail protruded, replaced
L.A.	38	Excellent	4-24-49	
J.B.	48	Excellent	10-3-46	
L.D.B.	48	Excellent	7-27-48	
M.B.	15	Excellent	4-18-51	
M.B.	66	Excellent	12-13-46	
A.B.	7	Excellent	12-4-51	
E.B.	8	Good	11-21-51	
I.C.	27	Fair	6-3-49	Nail protruded; not replaced; removal refused
H.C.	37	Excellent	5-16-49	
A.C.	31	Excellent	8-9-48	
N.C.	13	Poor	5-1-51	
I.D.	29	Good	1-4-50	Nail protruded slightly
C.D.	7	Good	1-2-52	
I.D.	33	Poor	9-1-49	Necrosis
V.D.	28	Poor	3-8-50	Necrosis and prosthesis
K.F.	10	Good	3-15-51	
A.M.F.	6	Good	1-30-52	
K.G.	36	Excellent	7-5-48	
J.H.	23	Excellent	11-16-49	
O.H.	20	Excellent	10-12-50	
F.H.	36	Excellent	7-30-48	
L.H.	21	Excellent	2-24-49	
R.H.	6	Poor	3-10-49	Protrusion and aseptic necrosis
W.C.H.	40	Excellent	12-21-48	
H.H.	15	Good	11-3-49	
E.H.	33	Good	1-4-49	
D.M.H.	9	Excellent	9-28-51	
E.J.	43	Poor	9-5-48	Nail protruded; shorter nail inserted; nail removed; A. necrosis developed late
E.J.	27	Excellent	3-28-50	
B.M.	24	Excellent	7-1-50	
S.M.	16	Excellent	2-22-51	
W.M.	47	Good	10-20-47	Nail removed; osteotomy
J.M.	12	Poor	4-19-51	Protrusion; necrosis
W.L.N.	34	Poor	3-13-49	Necrosis
I.N.	42	Good	3-26-48	
W.B.N.	25	Poor	4-27-50	
G.O.	21	Excellent	10-19-50	
J.L.P.	8	Good	6-12-48	
M.C.P.	20	Excellent	12-5-50	
C.E.P.	29	Excellent	3-14-49	
J.L.P.	24	Excellent	7-21-50	
E.J.P.	8	Excellent	11-28-50	Reinsertion of shorter nail
B.H.R.	21	Excellent	10-20-49	
W.F.R.	36	Good	9-6-48	
R.R.	21	Excellent	10-10-50	
J.F.S.	31	Excellent	11-23-49	Slight protrusion
H.K.S.	15	Excellent	3-13-51	
M.S.	48	Excellent	6-8-48	
S.E.S.	16	Excellent	4-25-51	
M.S.S.	30	Good	9-4-49	
S.H.S.	22	Excellent	9-4-49	
G.S.	48	Poor	7-17-47	
M.T.	20	Fair	11-30-50	Slow union
J.T.	26	Excellent	5-17-49	
E.T.	6	Excellent	5-16-50	To time of death
C.L.V.	44	Excellent	11-3-48	
M.W.	19	Excellent	11-25-50	
J.W.	25	Good	10-29-48	
E.W.	45	Fair	9-25-48	Mild aseptic necrosis; nail removed
A.W.	68	Poor	11-20-46	
J.B.W.	9	Excellent	9-30-51	
L.W.	7	Excellent	9-5-51	
E.W.	24	Excellent	8-11-49	

for the hip region in which a degenerated or necrotic femoral head has been removed, the senior author has devised a prosthesis that goes on over his nail. As most of these patients already have one of the nails in place, it is a relatively simple procedure to go in through the Smith-Peterson approach, remove the necrotic head and slide one of these devices over the protruding tip of the nail. The collar shown in the photographs forms a buttress against the osteotomized or severed femoral neck and thereby regulates the distance from the prosthetic head to the trochanter of the femur. This restores the normal neck length and maintains the "bone-muscle lever" relationship of the normal hip. We allow about ¼ inch (0.6 cm.) of dead space in the bulbous hollow end of the prosthesis so that if the neck of the femur absorbs and shortens to more than this extent the force is transmitted to the screws holding the flange of the nail to the shaft of the femur. This prevents any further shortening of the neck. When any hip prosthesis or arthroplasty cup encroaches on the trochanteric region where the blood vessels, nerves, tendons or other soft tissues are attached to the bone, pain and disability result. Therefore, every effort should be made to keep the prosthesis away from this important zone. To date we have just 12 patients for whom we have tried this operation with this device. It is too early to arrive at any definite conclusions, but the results thus far are quite encouraging. It should be mentioned in regard to this operation that, because of marked shortening (when present) the orthopedic table with traction should be used.

SUMMARY

Many points referable to the treatment of fractures of the upper end of the femur are mentioned, with a few definite conclusions drawn from the authors' experience and observations. A method is described for use of the senior author's solid flange hip nail, with its variations for all fractures from the base of the femoral head to the subtrochanteric region, which appears to offer a distinct advantage over many other methods of treatment of these fractures. Certain pitfalls must be guarded against and precautions observed in this treatment, but the results warrant care and attention to necessary details.

RÉSUMÉ

L'Auteur énumère divers traitements de fractures de l'extrémité supérieure du fémur; il tire aussi quelques conclusions basées sur son expérience et sa pratique. On décrit un procédé se servant d'un clou spécial pour la hanche; procédé qui varie avec lesfractures allant de la base de la tête du fémur à la région sous-trochantérienne et qui offre un avantage très supérieur aux autres procédés en usage. Il faut éviter certains écueils et prendre les précautions nécessaires pour obtenir le meilleur résultat possible.

RESUMEN

Se mencionan numerosos puntos respecto al tratamiento de las fracturas del extremo superior del fémur, con algunas conclusiones definitivas derivadas de la expriencia y observaciones de los autores. Se describe un método para el uso del clavo original del autor, con sus variaciones para todas las fracturas de la base de la cabeza femoral a la región subtrocantérea, que parece ofrecer diferente ventaja sobre otros muchos métodos de tratamiento de estas fracturas. Deben evitarse ciertos fracasos y observarse determinadas precauciones, pero los resultados garantizan cuidado y atención para los detalles necesarios.

RIASSUNTO

Vengono elencate molte norme riguardanti la cura delle fratture dell'epifisi superiore del femore, con alcune precise conclusioni tratte dall'esperienza e dall' osservazione degli Autori. Viene descritto un metodo introdotto dagli Autori, con le

sue variazioni per tutte le fratture comprese tra la base della testa femorale e la regione sottotrocanterica; tale metodo sembra offrire parecchi vantaggi sui molti altri sistemi di cura di tali fratture. Nell' applicazione di esso occorre guardarsi da certe cause di errore e occorre osservare alcune precauzioni, ma i risultati giustificano la cura e la attenzione ai necessari dettagli.

SUMÁRIO

Muitos pontos referentes ao tratamento de fraturas da extremidade superior do femur são mencionados, com algumas poncas conclusões definitivas estabelecidas pelos autores, baseadas em suas experiencias e observações. Um metodo é descrito para o uso do solido cravo original do autor principalmente para coxa, com variações para todas fraturas da base da cabeça femural até a região sub-trocantérica, a qual parece oferecer distinta vantagem sobre muitos outros metodos de tratamentos destas fraturas. Certas armadilhas devem ser previstas e certas precanções tomadas neste tratamento, mas os resultados dependem de cuidados e atenções especiais a todos os detalhes necessarios.

ZUSAMMENFASSUNG

Es werden viele mit der Behandlung von Bruechen des oberen Endes des Oberschenkelknochens zusammenhaengende Fragen eroertert und einige endgueltige Schlussfolgerungen mitgeteilt, zu denen die Verfasser auf Grund eigener Erfahrung und Beobachtung gelangt sind. Es wird eine Methode zur Anwendung des vom Seniorverfasser angegebenen soliden Hueftflanschnagels mit allen fuer die verschieden Brueche zwischen der Basis des Oberschenkelkopfes und der subtrochantaeren Gegend in Frage kommenden Variationen beschrieben. Die Methode bietet offenbar deutliche Vorteile gegenueber vielen anderen zur Behandlung solcher Brueche angewandten Verfahren. Man muss vor gewissen Tuechken der Behandlung auf der Hut sein, und Vorsichtsmassnahmen muessen innegehalten werden. Die Erfolge rechtfertigen aber jede anzuwendende Sorgfalt und die Beachtung aller notwendigen Einzelheiten.

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Acute Small Bowel Obstruction

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THE early diagnosis of small bowel obstruction is related to the recognition of three essential clinical manifestations of the order and to the proper interpretation of the abdominal roentgenographic picture.

The clinical manifestations are those associated with a particular type of pain, visible peristalsis and borborygmus.

The pain associated with simple obstruction is characteristic and differs from any other type of abdominal pain. It is not localized to any one quadrant of the abdomen but is generalized. It is not constant but periodic; it lasts for a short time, is cramplike, increases in intensity and ends abruptly, only to recur shortly. It is not associated with any tenderness or rigidity. In fact, the colic of acute simple bowel obstruction is unlike any other kind of abdominal colic because of its diffuse nature, the intervals of freedom from pain and the absence of localized tenderness and rigidity.

Associated with this pain there moves across the abdomen, in cases of early obstruction, a visible intestinal peristalsis that is synchronous with the paroxysm of pain. This, likewise, is periodic and stops with the cessation of pain. Often these peristaltic waves may be seen to move across the abdomen in succession at the height of the crisis of pain. Later in the process, after distention has developed, the phenomenon may not be observed, as intestinal distention lessens the violence of the contraction and the visibility of the peristaltic wave.

Correlated with the seizures of pain and the appearance of peristaltic waves, a peculiar metallic sound is heard on listening to the abdomen, and this is synchronous with the pain and the visible peristalsis. The noise is unlike any other type of intra-abdominal sound, in that it has a metallic ring and ends abruptly in a crescendo at the termination of the pain, only to recur with the next crisis of intestinal colic. This is well heard by auscultation with a stethoscope over the abdomen during a paroxysm of pain. It is known as borborygmus.

With consciousness of the interrelationship of these symptoms and recognition of their significance, a clinical diagnosis can be made of simple small bowel obstruction.

The symptoms of strangulated small bowel obstruction are associated with a continuous type of pain, more acute at the climax of the colic. The pain is, therefore, not periodic as in simple obstruction. Peristalsis and borborygmus are less pronounced or not detectable at all, as the loop of strangulated bowel produces no violent contractions and the bowel above is slow to dilate. Some localized tenderness and rigidity are present, but never to the extent that is characteristic of an acute inflammatory process.

There is a variable degree of shock and an increased pulse rate, related, no doubt, to the sudden onset of strangulation and to the continuous presence of variable degrees of pain.

If there is a protruding mass on the surface of the abdomen to indicate a strangulated bowel, the diagnosis is immediately confirmed; or if the abdomen shows evidence of one or more operative incisions, the suspicion of hidden intestinal obstruction is further increased. These clinical manifestations associated with an increasing abdominal distention, without evidence of external strangulation or incisional scars upon the abdomen,

Read at the Sixteenth Annual Assembly of the United States Chapter, International College of Surgeons, Chicago, Sept. 12, 1951.
Submitted for publication Oct. 5, 1951.

likewise indicate bowel obstruction and call for immediate confirmation of the diagnosis.

Bowel Function.—The passage of gas, the movement of the bowels or adequate results obtained from an enema do not indicate that there is no obstruction. It must be remembered that there is nothing anatomically or physiologically wrong with the bowel distal to the obstruction, and it can function adequately. In fact, the distal portion of the bowel may empty itself from reflex action due to the presence of obstruction.

The function of the bowel distal to the obstruction has been emphasized by Wagensteen and Goehl, and attention has been called to the errors that may result if this is not fully recognized. Therefore, it can be said that the movement of the bowels, the passage of gas or adequate results from an enema by no means indicate patency of the intestinal tract.

Vomiting. — Regurgitant vomiting occurs early only in the presence of high intestinal obstruction. Since most small bowel obstructions are low, this type of vomiting does not occur until distention of the proximal bowel has become marked, abdominal distention is present and the clinical diagnosis is obvious. Early vomiting in cases of low obstruction of the small bowel is reflex, as it is in cases of colonic obstruction. Therefore, it can be said that vomiting in the absence of abdominal distention may or may not be due to obstruction, and further investigation is necessary for diagnosis.

Roentgen Evidence.—The roentgen ray is the only means by which a positive diagnosis can be made, the approximate site of the lesion determined and the probable nature of the obstruction ascertained. In interpreting a roentgenogram of the abdomen it must be remembered that gas is normally visible in the stomach and colon but not in the small bowel except in infants. Gas is present but is not detectable by roentgenogram because it is mixed or emulsified with the liquid contents of the small bowel and becomes discernable on the roentgen film only when the continuity of the bowel is obstructed. Therefore, gas observed in the small bowel by this method is significant of obstruction and can be detected in a few hours after it has occurred.

The pattern assumed by the gas in an obstructed bowel determines the probable nature of the obstruction. If the obstruction is of a simple type due to angulation of the bowel from an adhesive band or a band passing across the bowel, the proximal portion becomes distended and in so doing gradually assumes a definite pattern, the distended coils arranging themselves in a transverse position to the long axis of the body. The valvulae conniventes remain visible because the distended bowel is filled largely with gas and some liquid content; there is no extravasation of blood into the bowel, and the bowel wall is not edematous as it is in the presence of a strangulated obstruction.

This pattern becomes more pronounced with the advancement of the obstruction, until ultimately a stairstep arrangement of the proximal distended bowel is observed. The thickness of the bowel wall indicates a relative degree of plastic exudate, fluid or peritonitis.

A strangulated obstruction, however, presents no such arrangement of the bowel. No definite pattern is assumed by the distended coils of bowel in this type of obstruction. The distended loops arrange themselves in whatever portion of the abdomen the obstruction occurs; no characteristic pattern is assumed, and proximal distention above the site of strangulation is slow to develop, as has been emphasized by Wangensteen. In contrast to a simple nonstrangulating obstruction, the valvulae conniventes are not seen or easily detected, owing to the extravasation of blood into the strangulated loop of bowel, edema of the bowel wall and sanguinous fluid in the free abdominal cavity.

It is important to differentiate, if possible, between a simple nonstrangulated obstruction and a strangulated one. In the former, the visibility of the bowel is not in danger and operation can be de-

ferred until the patient can be physiologically prepared by chemical and fluid rehabilitation and the distended bowel decompressed by intestinal intubation. In strangulated obstruction the blood supply is damaged, gangrene and perforation of the bowel are imminent and operation cannot be deferred. Physiologic rehabilitation must be deferred until during and after the operation because of this impending danger.

Though careful correlation of the roentgen pattern of the distended bowel with the observations at surgical exploration, a competent roentgenologist can be of great assistance in determining the presence of small bowel obstruction, the approximate site of the lesion and the probable nature of the disorder. Careful study of the pattern of the gaseous distention enables one to determine the immediate urgency of the situation. I am firmly convinced that immediate operation in all cases of early bowel obstruction is important, but there are many patients with marked fluid loss and great abdominal distention who are not good subjects, physiologically or anatomically, for immediate surgical intervention. If in these cases one makes a careful study of the pattern of gaseous distention, as observed in a roentgenogram, and the lesion appears to be nonstrangulating, physiologic rehabilitation and intestinal intubation may be safely accomplished prior to operation. The operation then becomes elective and can be performed much more satisfactorily and safely than when great distention is present and anatomical difficulties are great and hazardous.

Figure 1 demonstrates the value of the roentgenogram in determining the type of small bowel obstruction. It shows the transverse pattern of the bowel distention, and the valvulae conniventes are clearly seen. The clinical manifestations and roentgen manifestations are those of simple obstruction, with no evidence of

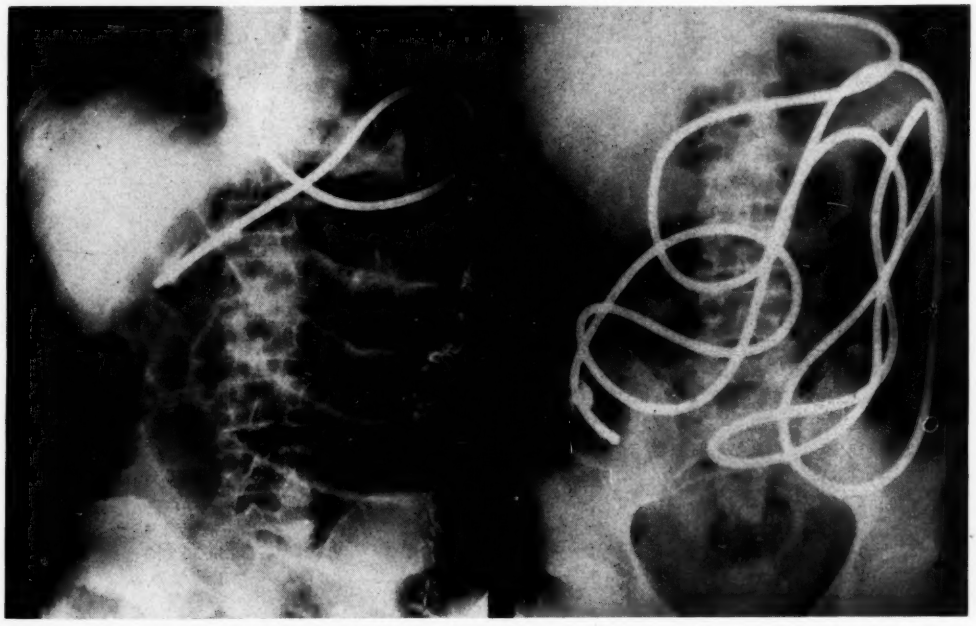

Fig. 1.—Simple type of small bowel obstruction. Note transverse position of distended portion of bowel. Valvulae conniventes are visible. Decompression was accomplished by intestinal intubation.

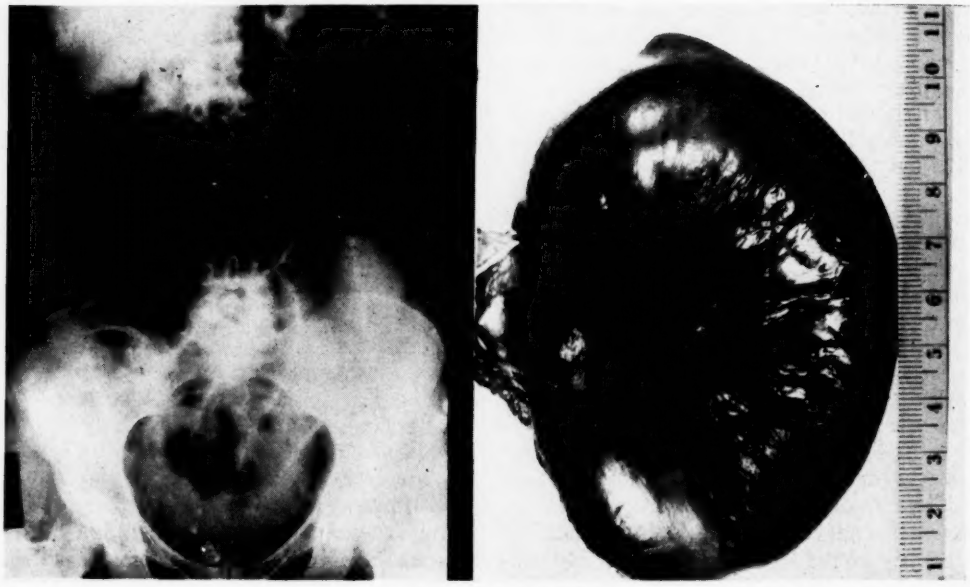

Fig. 2.—Roentgenogram showing irregular dark distended loop of small bowel. No valvulae conniventes are visible. (Operative specimen, gangrenous bowel.)

vascular damage. The Miller-Abbott tube decompressed the distended intestines and aided materially in the surgical approach.

Operations revealed a simple adhesive band obstructing the small bowel by constricting the lumen. Recovery was prompt after bowel had been freed from the constricting adhesion.

Figure 2 shows an irregular type of small bowel distention that conforms to no pattern related to the long axis of the body, and the valvulae conniventes are not seen. The clinical manifestation shows an uneven distention in the contour of the abdomen, with slight localized tenderness and rigidity. Immediate operation disclosed a small bowel loop twisted upon itself by a band of adhesions attached to the mesentery of the bowel. The bowel itself was black and required resection. Recovery was uneventful after resection and anastomosis. The roentgenogram was valuable in determining the nature of the obstruction and the need for immediate intervention.

In the past fifteen years, 67 patients have been operated upon for small bowel obstruction and 17 others have had varying degrees of obstruction, either associated with an inflammatory process within the abdomen or with postoperative distention that subsided without operation with use of the Miller-Abbott tube and supportive measures.

Analysis of the 67 operative cases of small bowel obstruction resulted in the following data:

There were 37 small bowel obstructions from adhesive bands in which no resection was necessary.

There were 19 strangulated obstructions, with 7 resections.

There were 6 cases of carcinoma of the small bowel (jejunum), with operative recovery.

There were 2 gallstone obstructions of the terminal portion of the ileum (one in rectal pouch not recorded).

One case of intussusception and 2 cases of 2 mesenteric thrombosis were included.

Six deaths occurred after operation. One occurred in a case of intussusception in a child; the cause of death was pneumonia. Another was due to peritonitis in a case of small bowel obstruction following cholecystectomy for stones. The third resulted from circulatory collapse following an operation for adhesive obstruction of the small bowel.

Two occurred in cases of strangulated hernia (1 resection, 1 anesthetic death). One patient died of mesenteric thrombosis. The 6 deaths constituted 8.97 per cent of the series.

The clinical and roentgen observations were carefully correlated by a joint conference with the roentgenologist, and a careful check was made at the operating table. Accuracy increased with the progress of the study. In no case was there a serious error in preoperative differentiation between simple and strangulated obstruction. This relationship in a small series was reported in 1944.

Intestinal Intubation.—The Miller-Abbott tube was used in the nonsurgical treatment of obstructions due to localized inflammatory processes. It was likewise used as an adjunct in more than one-half the operative cases, either as a preoperative or as a postoperative measure. Clinical and roentgen evidence of postoperative small bowel obstruction has frequently led to recovery by decompression with the Miller-Abbott tube, without operation.

Although the Miller-Abbott tube has fallen into disrepute in many sections of the country because of the difficulty of passage, it is beneficial and can be applied in selected cases of intestinal obstruction. Indications for its use in the treatment of

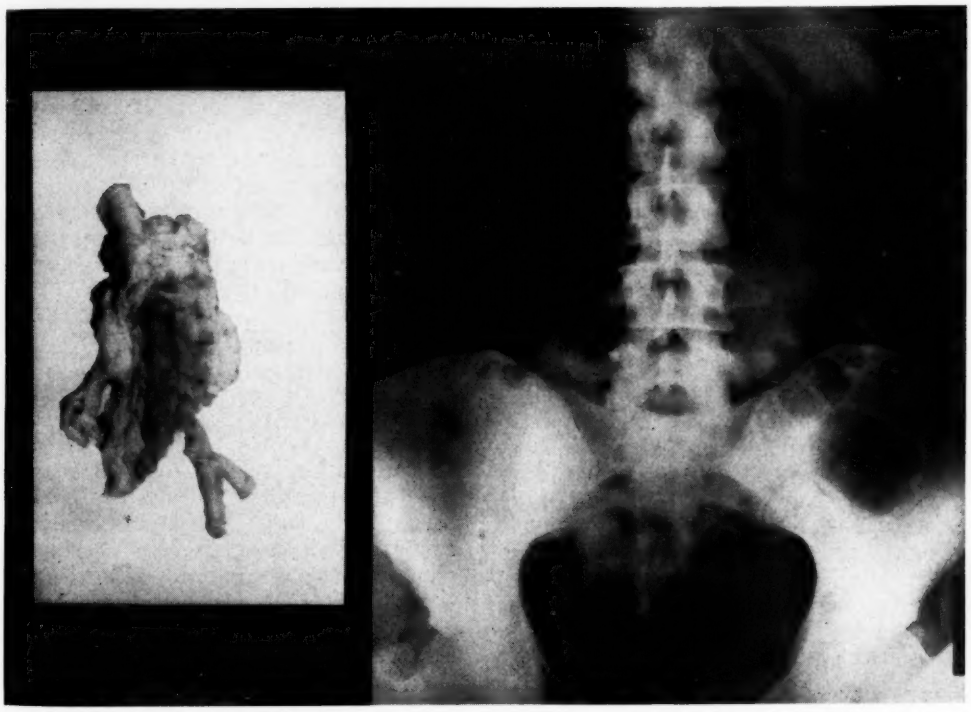

Fig. 3.—Mesenteric thrombosis. Note large thrombus in superior mesenteric vessel. Small bowel and right side of colon are distended.

obstruction of the small intestine are definite. My associates and I consider the procedure of passing the tube to be function of the roentgenologic department, which has voluntarily assumed this obligation and has had excellent success.

The tube is indicated in cases of simple adhesive obstruction with extensive proximal distention. It is valuable in cases of similar early obstruction to prevent postoperative ileus and to hasten restoration of an already partially distended bowel. It is contraindicated as a preoperative therapeutic measure in the presence of loop obstructions, volvulus, or strangulated obstruction when the viability of the bowel is in jeopardy. It may be valuable as a postoperative agent to prevent further distention and to hasten restoration of bowel tone.

The importance of competent roentgenologic assistance, therefore, in evaluating the nature of the obstruction of the small bowel and the need for immediate operation, deserves emphasis. It is well known that, in some instances of advanced simple obstruction, surgical intervention is more safely and effectively performed after physiologic rehabilitation and intestinal intubation have been satisfactorily accomplished.

Mesenteric Thrombosis. — Mesenteric thrombosis is in reality an obstruction, since peristalsis is abolished and bowel gangrene is imminent. The symptoms are different, as acute sudden pain may usher in the catastrophe. The roentgen picture shows gaseous distribution in the small bowel tract. With sudden onset, continuation of the pain and a distribution of gas in the small intestine, abdominal exploration should be done. Segmental resection may be possible, but too often the entire supply of the superior mesenteric artery is involved and nothing can be done (Fig. 3).

Intrinsic Obstruction.—Intrinsic lesions obstructing the small bowel are due to occasional obstruction from a neoplastic lesion. The symptoms are those of biliary colic with subsequent bowel obstruction and progressive abdominal distress from a gradual occlusion of the lumen by the neoplastic growth.

Surgical management of stone obstruction depends on the local condition of the obstructed bowel. If the stone can be dislodged it should be pushed upward to an uninvolved area of the bowel and removed through a longitudinal incision, which is closed transversely. If edema and reaction prevent dislodgment of the stone, resection with anastomosis is advisable. Incisional removal through an indurated edematous bowel is hazardous. It will not heal.

Neoplastic lesions require resection when possible. If inoperable, anastomosis should be made between the proximal and distal limbs of the bowel around the lesion. We have encountered only 7 neoplasms of the small bowel as compared to 385 resections for cancer of the colon and rectum.

Partial Obstruction.—In the presence of partial obstruction much difficulty may be experienced in making a diagnosis from the roentgenogram unless intermittent complete obstruction is present. Lockwood emphasized the advantage of an opaque medium as an aid to diagnosis. Its significance centers around the rapidity of its progress through the intestinal tract. Any retardation of the barium or the detection of a malformed loop is of great significance. Frequent roentgenograms are necessary to follow the barium in its intestinal advance.

SUMMARY

The clinical symptoms and signs of small bowel obstruction are characteristic and are unlike any other type of intra-abdominal disease. The colic is specific, differing from other forms of abdominal colic. Roentgen study most valuable in confirming the diagnosis, in locating the site and in determining to a large extent the nature of the obstruction.

The function of the bowel distal to the obstruction is unimpaired, and the fact that function is adequate it does not indicate the absence of obstruction.

The urgency of immediate surgical in-

tervention is emphasized in cases of strangulated obstruction, in contrast to the feasibility of delaying operation for advanced simple obstruction until physiologic measures and intubation procedures can be adequately employed.

Intestinal intubation and its indications are discussed.

RIASSUNTO

La sintomatologia clinica dell'occlusione del tenue è carat teristica ed è dissimile da ogni altra forma di malattia addominale. Le stesse coliche sono tipiche e differiscono dagli altri tipi di coliche addominali. Lo studio radiologico è di grande valore sia per confermare la diagnosi clinica sia per stabilire la sede e la natura dell'occlusione.

La funzione del tratto d'intestino a valle non è alterata e il fatto che tale funzione permanga non deve far pensare che non vi sia uno stato occlusivo.

Viene sottolineata l'urgenza dell'intervento chirurgico immediato nei casi di volvolo, contrariamente ai casi avanzati di occlusione semplice in cui l'operazione può essere rimandata fino a quando possano essere messe in opera l'intubazione e le altre terapie appropriate.

Viene poi esposta la tecnica e vengono discusse le indicazioni dell'intubazione intestinale.

ZUSAMMENFASSUNG

Die klinischen Symptome und Krankheitszeichen des Duenndarmverschlusses sind charakteristisch und unterscheiden sich von enen aller anderen Formen von Baucherkrankungen. Die Kolik ist von besonderer Art und anders als andere Bauchkoliken. Die Roentgenuntersuchung ist zur Bestaetigung der Diagnose, zur Lokalisierung der Erkrankung und in hohem Masse auch zur Bestimmung des Wesens des Verschlusses von groesstem Wert.

Die Funktion des Darmes jenseits des Verschlusses ist unbeeintraechtigt, und die Tatsache, dass ausreichende Darmfunktion vorhanden ist, laesst nicht den Ausschluss einer Darmverschlingung zu.

Die Dringlichkeit sofortigen chirurgischen Eingreifens in Faellen von eingeklemmten Darmschluessen wird betont im Gegrnsatz zur Zulaessigkeit eines Aufschubs der Operation in Faellen von vorgeschrittenem einfachen Verschluss, wo erst physiologische Massnahmen und das Einfuehren von Sonden in angemessener Weise durchgefuehrt werden koennen.

Die Behandlung mit Darmsonden und die entsprechenden Indikationen werden eroertert.

RÉSUMÉ

Les symptômes cliniques et signe de l'obstruction de l'intestin grêle sont caractéristiques et ne ressemblent pas à d'autres types de maladie intra-abdominale. La colique est spécifique et diffère des autres formes de la colique abdominale. L'étude radiologique a grande valeur pour confirmer le diagnostic, pour signer la lésion et pour déterminer la nature de l'obstruction.

La fonction de la partie distale à l'obstruction n'est pas touchée et le fait que la fonction est adéquate n'indique donc pas l'absence d'obstruction.

L'urgence d'une intervention chirurgicale immédiate dans les cas d'obstruction par étranglement est mise en valeur, contrairement à la possibilité de retarder l'opération et d'employer les moyens physiologiques et intubation dans les cas d'obstruction simple. On discute ensuite de l'intubation intestinale et deses indications.

SUMÁRIO

Os sintomas clinicos e os sinais de obstrução do intestino delgado são caracteristicos e diferentes de qualquer outra doença intra-abdominal. A colica é especifica diferindo de outras formas de colica abdominal. O estudo radiologico é de grande valôr para confirmar o diagnostico, para localizar o sitio e para determinar em larga extensão a natureza da obstrução.

A função do intestino distal á obstrução não é prejudicada e o fato de que a função é adequada não indica ausencia de obstrução.

A urgencia de intervenção cirurgica imediata é realçada nos casos de obstrução por estragulamento, em contraste com a prudencia de se adiar a operação por obstrução simples avançada até que medidas fisiologicas e processos de intubação possam ser adequadamente empregados.

A intubação intestinal e suas indicações são discutidas.

RESUMEN

Los síntomas y signos clínicos de la obstrucción del intestino delgado son característicos y no corresponden a ningún otro tipo de enfermedad intrabdominal. El cólico es específico, diferente de las otras formas de cólico abdominal. El estudio röntgen es muy valioso para confirmar el diagnóstico, localizar el sitio y determinar ampliamente la naturalez de la obstrucción.

La función del intestino distal a la obstrucción no es alterada, y el hecho de que la función sea adecuada no indica ausencia de obstrucción.

La urgencia de la intervención quirúrgica inmediata es señalada en casos de obstrucción estrangulada, en contraste con la posibilidad de demorar la operación para la obstrucción simple avanzada, hasta que las medidas fisiológicas y los procedimientos de intubación puedan emplearse adecuadamente.

Se discuten la intubación intestinal y sus idicaciones.

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Postgraduate Surgical Courses to be Presented in English by Vienna Academy of Medicine in Cooperation with the International College of Surgeons

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Endometriosis

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A SERIES of 271 cases of endometriosis covering a period of ten years has been reported in a previous paper.[1] The conclusion reached was that satisfactory results followed removal of the uterus and involved ovarian tissue, but that all normal ovarian tissue should be preserved. The sites of endometriosis in my series were as follows: (a) ovary, (b) uterine ligaments (uterosacral, broad and round ligaments); (c) rectovaginal septum; (d) pelvic peritoneum; (e) rectosigmoid; (f) uterus; (g) cervix; (h) laparotomy scar; (i) urinary bladder, and (j) umbilicus.

The present paper reports in detail the endometriomas occurring in the laparotomy scar and those observed in the urinary bladder. This paper reports on the more unusual locations of endometriosis, some included in the earlier report but not described in detail, and others from a more extended survey.

Endometrioma in Abdominal Scar.—Twenty-three cases of endometrioma in the laparotomy scar have occurred in my service and that of my late chief, Dr. B. Z. Cashman, in the Elizabeth Steel Magee and St. Francis Hospitals in Pittsburgh, during the past twenty years. In 9 of these cases the lesion consisted of a mass, which was tender and painful, especially at the time of menstruation. In the other 14 cases there was a sinus opening on the surface that discharged blood at the time of menstruation. Probably the most interesting observation was that in 17 of the cases the previous operation had been bilateral salpingectomy and drainage had been employed. In 2 of them a fundectomy as well as a salpingectomy had been done. Three patients had undergone salpingectomy elsewhere and did not know whether drainage had been used. Of the other 3 of the 23 cases, the lesion in 1 case followed an operation for endometriosis; the uterus had not been removed, but drainage had been employed. In another, hysterotomy had been performed, with removal of the products of conception, no drainage being used. In the third case the lesion followed an appendectomy with drainage.

Drainage after salpingectomy was the chief etiologic factor in this series of endometriomas of the abdominal scar. The most common history was that a sinus persisted after removal of the drain and the patient menstruated through the sinus. Apparently when the tubes are removed and the round ligaments are sutured over the cornu of the uterus, particularly if the intra-uterine portions of the tubes have been removed and the sutures consist of catgut, the sutures may be absorbed and a sinus forms. This sinus extends from the uterine cavity to the abdominal wall. In this way pieces of endometrium from the menstruating uterus may grow along the sinus and be engrafted in the abdominal wall. Sampson[2] expressed the opinion that endometriosis in the stumps of the tubes after salpingectomy is common, and that this may be due to either uterine or tubal mucosa. At times the tubal mucosa may take on uterine mucosal characteristics, and it is possible that peritoneal endometriosis or endometriosis in abdominal scars may originate from uterine or tubal mucosa. Sampson observed that sprouts grow out from the traumatized mucosa of the tubal stumps and may invade the uterus and ovary. In 1 case, in which a long sinus extended from the uterus to the abdominal

From the Department of Gynecology, University of Pittsburgh.
Read at a Regional Meeting of the International College of Surgeons, Pittsburgh, March 13, 1952.
Submitted for publication June 24, 1952.

wall, Sampson observed that the sinus was lined with endometrium and the endometrium was also invading the abdominal scar.

It is noteworthy that, of my own 23 cases in which the patients were later operated on for endometrioma in the scar, the original operation was done for endometriosis in only 1.

In a previous paper[1] it was our experience endometriosis subsides after removal of the uterus. We have never seen an endometrioma develop in the scar after hysterectomy. Recently we saw a patient who complained of a painful lump in the scar after hysterectomy. The mass was tender, and it was thought that perhaps the mass was an endometrioma. Microscopic examination showed a desmoid tumor.

The operations for endometrioma in the abdominal scar were done from six months to eleven years after the original operation, with an average of interval of four and two-thirds years. The scar with the endometrioma was excised in 15 cases. Of the other 8 cases, hysterectomy only was performed in 1, hysterectomy with unilateral oophorectomy in another, hysterectomy and bilateral oophorectomy in a third, and removal of one ovary or a part of an ovary in the other 5. In all these procedures the endometrioma of the laparotomy scar was excised. The diagnosis of endometriosis was confirmed by tissue examination in 18 cases. In 5 cases there was no record of histologic diagnosis.

Endometriosis of the Urinary Bladder.—There were 4 cases of endometrioma of the bladder. Those in which there were implants on the uterovesical fold of the peritoneum or serosal implants on the vesical peritoneum are not included. The case histories are summarized as follows:

A patient aged 33 complained of bladder pain and hematuria during the menses over a period of ten years. The amount of blood varied from a blood-stained urine to blood with clots. There was a history of severe cramps with menstruation. Cystoscopic study revealed a small area on the left side of the bladder dome, resembling granulation tissue, and on this area there were two pinhead-sized blood clots. At operation a small, reddened, puckered area was fulgurated and the bladder was closed in layers. Other evidence of endometriosis consisted of implants on the pelvic peritoneum. Operation consisted of hysterectomy with unilateral oophorectomy. The diagnosis was fibromyoma uteri, endometriosis of the pelvic peritoneum and the urinary bladder. Since laparotomy there has been no recurrence of bleeding.

The second patient was 37 years old and complained of dysmenorrhea and suprapubic pain on urination. Microscopic examination of catheterized urine showed red blood cells, and a blood chemical test gave positive results. A nodule was removed from the posterior superior surface of the bladder wall. This nodule presented a raised area studded with dark bluish pinhead-sized cysts—typical of endometrioma.

The third patient was 34 years of age. She complained of dysmenorrhea and of burning and frequency of urination during menstruation. There was no history of hematuria. At operation an endometrial adenoma was removed from the bladder. It was located in the right posterior wall of the bladder, about 4 cm. above the right ureteral orifice. The tissue diagnosis was endometrioma of the bladder wall.

The fourth patient was 42 years old and complained of dysmenorrhea, menorrhagia and backache. There was no history of hematuria. The only urinary symptoms consisted of frequency immediately after menstruation. At operation a puckered nodule 1 cm. in diameter was observed in the bladder wall. Operation consisted of hysterectomy with right salpingo-oophorectomy. The endometrioma was not removed, and since the hysterectomy the vesical symptoms have been absent.

Bladder symptoms aggravated at the time of menstruation should suggest the presence of endometriosis of the bladder wall. There may be hematuria and there may be a palpable mass in the region of

the bladder. Biopsy is necessary to distinguish this lesion from neoplasm.

These patients were treated as follows: In 2 cases the uterus and ovaries were removed; hysterectomy with removal of the one remaining ovary was performed in the third case, and in the fourth case hysterectomy with unilateral oophorectomy was done. For young women who wish to become pregnant, a conservative operation, with excision of the lesion from the bladder, is the best treatment. When there is extensive pelvic endometriosis with adhesions, however, hysterectomy with preservation of uninvolved ovarian tissue is sufficient without resection of the lesion in the bladder. When the patient is near the menopause and shows extensive endometriosis of the ovaries, hysterectomy with surgical castration and without excision of the bladder lesion is sufficient. Except in Case 4, the treatment has been excision of the mass in the bladder. We know that this is not necessary, because removal of one or both ovaries with the uterus will cause subsidence of the lesion and the symptoms.

SUMMARY

This paper reports some unusual sites of endometriosis: postoperative abdominal scars and the urinary bladder.

Because of its increasing incidence, endometriosis remains a major gynecologic problem.

RESUMEN

Se comunican algunos sitios no comunes de endometriosis: cicatrices abdominales postoperatorias y vejiga urinaria. La endometriosis permanece como un gran problema ginecológico, debido al aumento de su incidencia.

RÉSUMÉ

Cet article illustre certains cas rares d'endométriose de la cicatrice abdominale post-opératoire et de la vessie. La fréquence en fait un prodème sérieux en gynécologie.

RIASSUNTO

Nel lavoro vengono riportate alcune rare localizzazioni dell'endometriosi: cicatrici addominali post-operatorie e vescica urinaria.

Per la sua frequenza sempre maggiore l'endometriosi costituisce uno dei problemi ginecologici di maggior importanza.

ZUSAMMENFASSUNG

Die Arbeit berichtet ueber einige ungewoehnliche Lokalisationen von Endometriose, naemlich in postoperativen Bauchnarben und in der Harnblase.

Die Endometriose stellt wegen der wachsenden Haeufigkeit ihres Auftretens ein groesseres gynaekologisches Problem dar.

SUMARIO

Esta artigo relata alguns sitios raros de endometrioses: cicatrizes abdominais posoperatorios a bexiga.

Devido a sua crescente incidencia a endometriose permanece sendo um grande problema ginecologico.

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Urologic Symptoms Relieved by Postural Corrections

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THE specialty of urology is one of the most precise fields of medicine. After a careful history, physical examination, cystoscopic study with retrograde pyelograms, urinalyses and cultures, one should be able to give an opinion as to whether pathologic change is or is not present in the patient's urinary tract.

Pyuria, pain and hematuria constitute the cardinal triad of diseases of the urinary tract. Pain in varying degrees is one of the most frequent symptoms, yet it may be absent in patients with very serious diseases. The location and radiation of pain frequently suggest the organ from which the pain arises, and much information is obtained when the patient is seen during the attack. Surgeons are very much aware of the gastrointestinal symptoms, such as nausea, vomiting, et cetera, observed in an acute attack of pain caused by a stone passing down the ureter.

In the case of the patient with a suggestive urologic history what should be the course of procedure when examination and all available tests have been made and have given negative results? This type of patient is the one to be dealt with in this paper, since urologic treatment has brought about no relief. Consultation with an orthopedic surgeon or a physiatrist is often helpful in finding the cause of the symptoms.

Too many members of our profession have always looked disdainfully on the patient with a painful back, considering him a possible hypochondriac. The layman with pain in the back considers that he or she has either kidney trouble, a fallen uterus or some orthopedic disorder. Surgeons nowadays are not as eager to operate on these patients for the relief of their pain as they were in the past decade. More methods of study and more specialists to consult are available, as well as better laboratories and roentgen facilities to aid in the diagnosis. The hospitals are becoming more observant of surgery, and the gross specimens are more thoroughly scrutinized. The public has its eyes focused on the surgeon and expects and demands a higher percentage of cure than at any previous time in our generation. Advancement in medicine and the specialties of orthopedics and physical medicine have engendered a new insight in the treatment of vague disorders of the back, and consequently remarkable results are being obtained.

Urologists are always on the lookout for urologic anomalies. Anomalies of the spinal muscles and nerves often give rise to pain resembling that produced by a solitary stone in the kidney, stricture of the ureter, prostatitis or malignant change in the genito-urinary tract.

I shall not discuss malignant disease of the spine and abdomen, retroperitoneal tumors, nucleus pulposus or spinal injuries. I wish to stress the problem of the patient who has pain in the back—pain often diagnosed as due to urologic disorders and treated accordingly.

Urethral dilatation, ureteral catheterization or cystoscopic examination will apparently completely relieve pain in the lower part of the back even if the pain is actually due to other causes. This is achieved by a simple process of adaptation of the various types of afferent impulses whereby they reach the same segmental internuncial pool when subjected to any painful or traumatic procedure. However, as soon as the internuncial pool recovers

Read at the Sixteenth Annual Congress of the United States and Canadian Section, International College of Surgeons, Chicago, Sept. 12, 1951.
Submitted for publication Oct. 5, 1951.

its normal sensitivity and segregation of different stimuli, the awareness of the back pain will return.

There is no standard posture or gait. Postural corrections are being studied and used in treatment more and more by large clinics and rehabilitation centers. After physical examination a patient is often told that his pain is due to his posture, but very little is said or done about the correction. Examination of the patient's shoes may be worth while. Well-worn shoes should be examined for symmetry of wear, especially scuff type wear of one heel, and increased roundness on pressure type wear of the tip of one toe. All of these points should be taken into consideration, and if doubt is present, an orthopedic surgeon should be consulted.

In some patients the chief cause of chronic pain in the back is a relative shortening of one leg, usually congenital but often the result of a fracture. If the patient stands most of his time, he will usually form the habit of standing on the longer leg, which results in a definite protrusion of the ipsilateral hip in a lateral direction, with an indentation of the same flank, even to the extent of a fold of the skin just above the lateral iliac crest. If the patient walks a great deal, he will overdevelop the quadratus lumborum on the shorter side, and so produce a wide and more muscular type of indentation of the flank on that side. In this case he will also be able to elevate the pelvis on the short side more easily than on the long side. In practically every case the patient will take a shorter forward step with the short leg than with the longer one. It is not always possible to detect a shortening of one leg, and a deformity in the spine is not always perceptible in the gait. The patient compensates by moving his trunk in the opposite direction from his deformity. A photograph will often show this deformity, and the patient may be the first to notice it.

Minimum examinations now recommended by our Department of Physical Medicine are as follows:

1. Place the patient supine in good longitudinal alignment with pelvis level, ankles moderately dorsiflexed, and internal malleoli about ¾ inch (1.9 cm.) apart. Measure from the anterior superior iliac spine to the midpoint of the ipsilateral internal malleolus, and compare the measurements of the two sides. This may be inaccurate, owing to: (a) rotation of one pelvis in a sagittal plane, (b) congenital deformity of the anterior superior iliac spines, destroying their value as anatomic landmarks.

2. Stand the essentially nude patient in front of a mirror, and with plumb bob determine coronal asymmetry of buttocks and pectoral girdle with reference to heels. Especially notice protrusion of either hip (shelf top), indentation of either flank, height of lateral iliac crests from floor.

3. While the patient stands with heels together and legs straight, have him bend forward to get fingers as close to toes as possible and note the lack of levelness of the posterior superior iliac spines.

4. Place successive thickness of lifts under the short heel, and determine the optimum amount that will keep the posterior superior iliac spines level in the No. 3 test and permit the patient to get his fingers closest to the toes with the minimum of back pain. This is more important than improving the symmetry of the hips or flanks.

5. Exercise care in recommendation. Usually patients can tolerate no more than ¼ inch lift (0.6 cm.) on a shoe heel initially, and no faster increase in this lift than about ¼ inch per month. If more than 1½ inches (3.7 cm.) of lift is needed, a platform should also be placed under the sole of the shoe. If the patient insists upon wearing high-heeled shoes, it is preferable to take the desired difference in heel height off the high heel rather than add it to the low heel. The lift should be wedge-shaped (thinner at the front) in order to permit the shoe sole and heel to rest reasonably evenly on the floor; otherwise too much "rocking" will result in increased instability.

Urologic Conditions Causing Pain in

the Back.—1. Infection in the prostate, whether specific or nonspecific, often results in backache, painful spine and back muscles, and an aching, tired feeling in the legs. This pain is usually not severe, but is described as a "heavy feeling" in the back and hips. It is temporarily relieved after prostatic massage.

Advanced carcinoma of the prostate gland, with or without metastasis to the spine and pelvis, is often the source of excruciating pain. The pain is constant, but worse on motion, and is referred to the back, perineum and thighs, requiring opiates for relief. In the late stages carcinoma of the prostate is not difficult to diagnose, and a flat film shows metastasis with the presence of osteoblastic or osteoclastic changes.

Stones in the prostate cause symptoms suggestive of prostatitis. They are located by rectal palpation of the prostate or by routine roentgen study of the pelvis.

2. Urethral stricture resulting from injury or infection refers pain to the loins, pelvic region, renal areas and thighs. This pain is insidious, not severe, and noticeable results are obtained by dilation of the urethra.

3. Ureteral stricture of the acquired type is almost invariably associated with pain. It may originate in the strictured area or may cause renal pain from blockage as a result of infection in the kidney. The pain may be in the front of the thighs or may radiate along the course of the sciatic nerves. Often it simulates renal colic due to a stone. Vague abdominal symptoms, headaches, nausea, vomiting and vague abdominal discomfort are often associated with true ureteral strictures. Dilation of a true stricture is usually succeeded by the relief of pain. After two or more dilations of the ureter through No. 9, 10 or 12 catheters, with no relief of pain,[1] a further search should be instituted for pathologic conditions. Stones in the ureter often give severe pain, intermittent and often radiating to the genitals and thighs.

4. Pain resulting from infection or abscess in or around the kidney is usually intermittent and often radiates anteriorly or along the course of the ureter. Perinephritic abscess frequently results in tenderness in the costovertebral angle anteriorly, muscular rigidity, intermittent high fever, a high leukocyte count and often a tumor mass in the renal area. In many cases cortical abscesses give symptoms less severe than those aforementioned and are often hard to distinguish from appendicitis when they occur on the right side. Renal and ureteral stones may be symptomless or pain may be the predominating symptom. This pain, which is often associated with pus and hematuria, may vary from a heaviness in the renal region to serve pain, often beginning in the kidney fossa and radiating anteriorly.

A patient recently came to the clinic for a routine checkup, thinking that she might have arthritis, since her mother was arthritic. A routine examination of the kidneys, ureter and bladder revealed bilateral renal calculi. There were no symptoms of stones, and the urine was normal.

REPORT OF CASES

CASE 1.—Mrs. L. R. came to the clinic on May 30, 1951, with a history of recurrent pain in the left lower part of the back for the past ten to fifteen years and a burning sensation in the vagina and the pelvic regions. She had been seen by a urologist; numerous ureteral dilatations had been performed and roentgenograms taken, but the results were essentially negative. Subjectively some relief had been obtained by urethral dilatation, and she continued to return for treatments.

She was first seen in the office wearing a pessary, which did not give her relief. At that time the greatest pain occurred in the left lower quadrant, radiating directly backward to the sacroiliac joint at the superior end. The pain was usually worse when the patient was standing or walking and only moderately increased by bending, stooping or lifting. A complete urologic and pelvic examination was done again but revealed no abnormality.

The patient was sent to the Department of Physical Medicine, and it was the opinion

1. Herman: The Practice of Urology, 1st Edition, page 341.

Fig. 1.—Intravenous pyelogram showing essentially normal conditions.

of the physiatrist that she was leaning her body perceptibly to the left.

Examination revealed the bilateral patellar, achilles and plantar reflexes to be equal and normal. The vibratory sense was normal over the entire lower portions of both legs. Tactile sensation was slightly increased over the lateral aspect of the lower part of the leg but was otherwise bilaterally symmetric. When the patient sat with her knees over the edge of the bed, there was a general tilt of the trunk to the left until the neck was about 1 inch (2.5 cm.) to the left of the buttock; when she sat with the knees extended, she could move the fingers to within about 1 inch of the toes. This caused tension ache in the lower part of the lower back, but no acute pain. There was no localized tenderness over any part of the vertebral spine, the lumbosacral and sacroiliac joints, the greater sciatic notches or the nerves. Anterior straight leg raising was primarily limited by obesity of the abdomen and tension in the gluteus medius muscle. Posterior straight leg raising did not increase the pain in the back. When the patient stood, there was a definite protrusion of the left hip and an indentation of the right flank, which were partly corrected by a ⅜-inch (0.9 cm.) plank under the right heel, with which the patient was able to bend and touch fingers to toes with greater ease.

The impression was that of malposture backache due to a ¾-inch (1.9 cm.) shortening of the right leg. The right leg measured 33¼ inches (84.2 cm.) and the left 34 inches (86.3 cm.).

It was recommended that a ¼-inch (0.6 cm.) lift on the right shoe heel should be provided and increased at the rate of ¼ inch per month until the back pain clears, or until the maximum lift of ¾ inch was reached.

Urinalysis, a blood count, a Kline test of the blood and examination of the spinal fluid gave negative results. This patient is making satisfactory improvement.

CASE 2.—Mr. W. B., unemployed because of a painful back, arrived at the clinic on May 16, 1950. There was a history of pain in the lower part of the back, principally in the sacroiliac region, for many years. There was no radiation of this pain, but the patient noticed that it was worse when he was bending over and attempting to regain the erect position. In childhood he had had a serious infection involving his left foot, since which the foot had been stiff. Pyelograms had been made previously at the city hospital, as well as numerous cystoscopic examinations with dilatation of the ureters, with no results.

The urine was normal. The prostate gland was essentially normal on microscopic exami- was somewhat congested, but the secretion nation. Prostatic massage gave no relief, and the patient returned with continuous pain in the lower part of the back.

He was sent to an orthopedic surgeon, who

Fig. 2.—A ¼ inch elevation, hardly perceptible, on the left shoe heel.

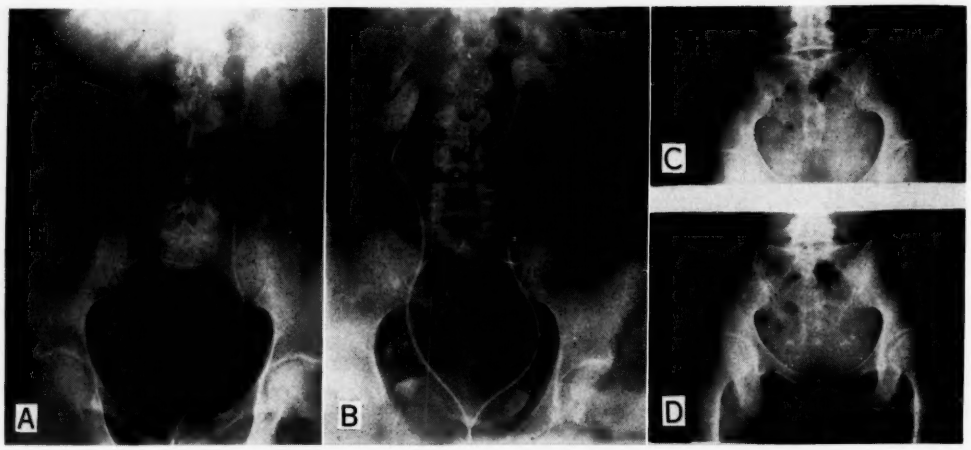

Fig. 3.—*A*, obliteration of first through fourth spinal processes of lumbar vertebrae. Pyelogram of left side is normal. *B*, right kidney in fairly good position after right nephropexy. *C*, roentgenogram of patient in the erect position without shoes. Crest of right ilium is noticeably lower than that of left. *D*, roentgenogram of patient in erect position, wearing corrected shoe heels, reveals crests of ilia the same height.

reported: "I think the diagnosis in this man's case is: (1) unstable fifth lumbar vertebra due to shortening of the left lower extremity. There is a downward tilt to the pelvis on the left side, and the left lower extremity was found to be ¾ inch (1.9 cm.) shorter than the right. The x-rays were essentially negative. He cannot bend from the hips in a fashion due to the stiffness in the toe joints. We recommend that he have some alterations in his shoes to balance the pelvis and think this will compensate to a large extent for this deformity. His left shoe was built up ⅜ inch higher than the right."

The patient was seen in the clinic four months later. At that time he was gainfully employed and performing his duties.

Case 3.—Mr. C. C., aged 36, arrived on June 12, 1951, complaining of pain in the lower part of the back, nervousness and inability to work. There was no history of injury to his back or any change in his occupation that would cause a severe pain in that region. He had had low back pain for many years, had noticed that he had worn off the heel of his left shoe and thought that the toe of his right shoe had worn off faster. Late in the evening the back pain gradually became worse; he was unable to sleep after midnight because of severe pain in his right posterior flank.

Roentgen examination of the spine, pelvis and kidneys, ureters and bladder revealed no abnormality; there were no significant changes to account for the pain. He gave no history of venereal disease or prostatitis.

Examination revealed that he had no pain on motion of the right leg, but there was pain on deep pressure over the right hip. The external genitals were normal. The prostate was slightly enlarged and boggy, but normal secretion was present. Urinalysis likewise gave negative results. We were of the opinion that this was not a urologic problem, and he was sent to the Department of Physical Medicine, from which department the following report was submitted:

Examination.—"There is ½ inch (1.2 cm.) shortening of the right leg. Patient stands with marked indentation of the right flank with protrusion in the left hip and about ½-inch tilt of the entire trunk toward the right. The patient notices the greatest ease in standing with his knees extended and stooping forward with a ⅜-inch (0.9 cm.) plank under his right heel, which approximately keeps his posterior superior iliac spine level in that position. There is marked tenderness over the entire right quadratus lumborum, especially at its attachment to the right iliac crest.

Impression: (1) Malposture backache due to ½ inch (1.2 cm.) shortening of the right leg; (2) spasm of the quadratus lumborum.

Recommendations: (1) ¼ inch (0.6 cm.) lift applied to the right shoe heel; (2) hot bathtub back soaks two or three times a day for twenty minutes in the Jostes position; (3) increase of right heel lift to ⅜ inch (0.9 cm.) or ½ inch (1.2 cm.) in about six weeks."

We have followed this patient closely for the past month. After elevation of his shoe heel he was able to return to work as a painter and states that he has no pain in his back since that time.

CASE 4.—Mr. U. B., aged 37, was first seen in the office June 12, 1947. He gave a history of back strain and hematuria seventeen to eighteen years ago, with no recurrence since that time. He had been discharged from the Army because of back disability. He returned to the coal mines, but was forced to leave in 1947 because of back pain. He now had severe pain in the right lumbar region, which might occur at any time of day and was irregular, being sometimes continuous and at other times interrupted by entirely pain-free intervals of as much as two weeks. Five years previously he had been operated on by his own physician for protrusion of the fifth lumbar intervertebral disc, with some relief of pain. Three months later he consulted his family physician for chronic prostatitis. He had lost a great deal of time from his work because of low back pain. As his symptoms were suggestive of prostatitis, he had been medically treated, with no results, and felt that his condition was slowly becoming worse. He had nocturia (one to three times nightly) and occasional burning on urination.

A prostatic massage was given. The prostatic fluid was normal. Urinalysis revealed no abnormality except for 2 to 4 pus cells per high power field. Examination of the chest gave negative results.

The patient returned for a checkup and for prostatic massage on June 24, 1947. He returned for three more treatments, with no results.

Cystoscopic examination revealed conditions within normal limits. The prostate gland was completely cleared of infection, but the patient returned on Dec. 19, 1950, complaining of pain in the back, which had been fairly persistent since his first treatment.

The reflexes were essentially normal. In the supine position the patient showed increased tenderness over the eleventh thoracic to the fifth lumbar vertebra, with slightly more pain on the right as compared with the left transverse processes. He proved able to do posterior knee-rocking extremely well, without any increase in pain; posterior straight leg raising did not produce pain.

Impression: Our impression was that of malposture due to 1-inch (2.5 cm.) shortening of the right leg, and weakness of the abdominal muscles.

Recommendations: The patient was advised to have his right shoe heel elevated ⅜ inch (0.9 cm.). This he did, and since that time he has been able to do his work without pain.

A recent checkup revealed a marked improvement in this patient, who is in better health than at any time in the past fifteen or twenty years.

CASE 5.—Mr. J. M. W. came to the clinic on May 12, 1950, complaining of pain in the left hip, extending down to the left thigh, and nocturia of a few weeks' duration. Examination revealed that neither kidney was palpable. The prostate was medium in size and boggy, and microscopic examination of the secretion showed it to be normal. Urinalysis gave normal results. Roentgen examination of hips and spine revealed no abnormality. An excretory urogram indicated normal conditions. The patient was seen again in three days, at which time no improvement was noted, and we were of the opinion that the lower part of the urinary tract was normal.

Consultation with an orthopedic surgeon was advised, and his report was as follows: "Examination shows that the man stands with a downward tilt to the pelvis on the left side, and the heel must be raised approximately ¾ inch (1.9 cm.) before the gluteal folds are on the same level. This is a rather marked pelvic asymmetry, and the patient says he had an injury to his pelvis years ago. His leg length

Fig. 4.—Heels corrected to ½ inch are hardly noticeable.

is approximately ½ inch (1.2 cm.) short on the left side. Neurologic examination gives entirely negative results. Straight-leg raising on the left side produces pain in the posterior aspect of the hip; there is a full range of motion, however, in the left hip and a good range of motion in the lumbar segment of the spine. There is persistent tenderness, apparently in the gluteus maximus muscle just at its attachment into the lateral aspect of the sacrum on the left. We recommend certain alterations in his shoes for better balance of the pelvis, and he is to have intensive physical therapy."

A recent check-up revealed excellent results, and this patient is working every day. He informed me that he never walked without his shoes, even across the room, lest his pain should recur. He has a ¼ inch (0.6 cm.) elevation on the heel of the left shoe that is scarcely noticeable (Fig. 2).

CASE 6.—Mrs. H. G. came to see me on Feb. 16, 1951, complaining of pain in the left side, along the course of the left ureter. She apparently had had the left lumbar third and fourth vertebral discs removed on Aug. 1, 1948, for which procaine vertebral blocks were used in July 1950, with complete relief until the latter part of December 1950. Since then she had become progressively worse. She had been treated by dilatation of the left ureter, with no results.

Examination with the patient lying on her stomach revealed her to be obese, with a scar from the first through the fourth lumbar vertebral spine. She had much pain on deep pressure over the first lumbar area. Roentgen examination and urinalysis gave essentially normal results (Fig. 3*A*).

She was referred to the Department of Physical Medicine, and thorough examination revealed extremities of normal length. There was increased tenderness over the left greater sciatic notch, and pressure over the midportion of the right thigh caused pain in the lumbar area.

Impression.—The clinical impression was (a) myalgia of the left quadratus lumborum area due to increased lumbar lordosis, obesity and weakness of the spine following the previous operation, and (b) old injury of the third left lumbar disc.

Recommendations. — Physiotherapy consisting of luminous heat and kneading massage to the lumbar portion of the back three times a day, was recommended, as were graduated exercises for the head, shoulder and abdomen. Weight reduction was also advised.

Course.—The patient did not follow any of the recommended treatment, and at the last account the same symptoms were still present.

CASE 7.—Mrs. M. J. S., aged 30, was formerly a ballet dancer and had performed handsprings until three years before consulting us. Her health had been good until September 1949, when she had a miscarriage, after which she experienced rather diffuse pain. The pain began in the right flank, and over a period of time gradually increased. Urologic examination was made and revealed right hydronephrosis with a floating kidney. In September 1950 a right nephropexy was performed, severing an aberrent vessel. The pain was relieved for about six months, during which time the patient led a quiet, sedentary life.

On her starting a normal life again the pain returned. It extended down the right thigh and was aggravated by her day's housework. She was reexamined, and pyelograms revealed the right kidney in good position (Fig. 3*B*). A gallbladder study was done, revealing a normally functioning gallbladder without stones. The results of urinalysis and blood count were normal. The report of examination in the Department of Physical Medicine was as follows: "All reflexes are normal. There is an indentation of the right flank, although the patient's standing posture of heels, coccyx and neck is very good. Measurements reveal a one-half inch shortening of the right leg (Fig. 3, *C* and *D*). The patient is advised to elevate the right shoe heel ½ inch (1.2 cm.) and avoid changing from high to low heels" (Fig. 4).

The patient has shown marked improvement since she has followed the recommendations of the Department of Physical Medicine. The pain in the right side and thigh has completely disappeared, but soon recurs when she wears shoes that have not been adjusted.

SUMMARY

The correction of faulty posture, as well as deformities, has relieved many patients who sought treatment under the impression that they had kidney disease. We have observed this result in the cases of many patients to whom treatment by urologists had given no permanent relief.

Patients consulting a physician for pain in the back should be examined thoroughly to find the cause. A careful his-

tory often discloses an old injury or fracture of the back or extremities which may be the cause of their complaints.

It is the author's opinion that a person who leads a sedentary life is as liable to pain in the back as is the laborer. After a physical examination and the use of all available diagnostic methods, one should be able to say whether or not the patient has a urologic pathologic condition.

The author has found consultation with the Department of Physical Medicine and Orthopedics most helpful in arriving at a diagnosis. The patient who has once received relief from his backache is able to carry on a gainful occupation and is, as a rule, extremely grateful.

RÉSUMÉ

Plus d'un patient se croyant atteint d'une pathologie rénale a été guéri en se corrigeant d'une position vicieuse ou d'une malformation. Ceci a été confirmé du fait que plusieurs de ces patients avaient consulté en Urologie sans résultat.

Ceux qui consultent le médecin pour douleurs au dos devraient avoir un examen minutieux afin d'en déterminer la cause. Une histoire précise démontre souvent un traumatisme ancien ou une fracture de la colonne ou des extrémités, source de leurs maux.

L'auteur est d'avis que celui qui est adonné à la vie sédentaire est sujet au mal de dos tout comme l'ouvrier. L'examen physique, l'usage des divers procédés de diagnostic, devraient permettre de diagnostiquer une pathologie urinaire.

L'auteur s'est trouvé trèsheureux du résultat obtenu en s'associant les services de médecine physique et d'orthopédie. Ce patient, soulagé de son mal de dos peut reprendre ses activités et conserver habituellement beaucoup de reconnaissance à celui qui l'a ainsi guéri.

ZUSAMMENFASSUNG

Vielen Kranken, die unter dem Eindruck, ein Nierenleiden zu haben, zur Behandlung kamen, wurde durch die Beseitigung von Haltungsfehlern und Deformitaeten geholfen. Derartige Erfolge wurden auch bei Kranken erzielt, denen der Urologe mit seinen Behandlungen keine dauerhafte Erleichterung verschaffen konnte.

Kranke, die wegen Rueckenschmerzen aerztlichen Rat suchen, beduerfen zur Aufdeckung der Ursache einer genauen Unternuchung. Eine sorgfaeltige Anamnese entdeckt haeufig alte Verletzungen oder Brueche des Rueckens oder der Extremitaeten, die moeglicherweise die Ursache der Beschwerden bilden.

Der Autor vertritt die Meinung, dass Personen mit sitzender Lebensweise genau so gut Rueckenschmerzen entwickeln koennen wie Arbeiter. Nach koerperlicher Untersuchung und Ausnuetzung aller zur Verfuegung stehenden diagnostischen Mittel sollte man in der Lage sein zu sagen, ob der Patient an einer urologischen Erkrankung leidet oder nicht.

Der Verfasser hat die Erfahrung gemacht, dass eine Konsultation mit der physikalisch-medizinischen und orthopaelischen Abteilung von groesstem Nutzen in der Diagnosestellung ist. Ist der Kranke einmal von seinen Rueckenschmerzen befreit, so kann er seiner Beschaeftigung und dem Gewinn seines Lebensunterhalts nachgehen und wird in der Regel ein sehr dankbarer Patient sein.

RESUMEN

La corrección de postura defectuosa, como la de deformidades, ha aliviado a muchos pacientes que contemplaban el tratamiento bajo la impresión de que se trataba de enfermedad renal. Se ha observado este resultado en los casos de muchos pacientes a quienes el tratamiento por urólogos había dado alivio permenente.

Los pacientes que consultan al médico por dolor lumbar deben ser examinados completamente para encontrar la causa. Una historia cuidadosa descubre con frecuencia una vieja lesión o fractura lumbar o de las extremidades, que puede ser

la causa de las melestias.

El autor opina que una persona de vida sedentaria es tan susceptible de quejarse de dolor como el obrero. Después de un examen físico y el uso de todos los métodos utilizables para el diagnóstico, debe decirse si el paciente tiene o no un estado patológico urológico.

El autor estima que la consulta con el Departamento de Medicina Física y Ortopedia es de mucha utilidad para llegar al diagnóstico. El paciente que ha sido aliviado de sus lumbalgias se encuentra capacitado para una ocupación provechosa y se muestra generalmente muy agradecido.

SUMÁRIO

A correção de post uras defeituosas como de deformidades tem aliviado muitos pacientes que procuram tratamento sob a impressão de que possuiam doença renal. Nós observamos este resultado em muitos pacientes cujo tratamento por urologistas não trouxe alivio permanente.

Pacientes que consultam o medico por dor nas costas deveriam ser examinados minuciosamente para se encontrar a causa. Uma cuidadosa historia muitas vezes revela um velho trauma ou fratura das costas ou das extremidades como causa.

Na opinião do autôr tanto a pessoa que leva vida sedentaria como o trabalhador braçal são igualmente predispostas ao lumbago. Depois do exame clinico e de todos os recursos adjuvantes de diagnostico dever-se-ia estar em condição de saber si o paciente apresenta afeção urologica ou não. O autôr tem se convencido de que conferencia com o Departamento de Clinica Medica e de Ortopedia são da maior utilidade para se chegar ao diagnostico. O paciente que obtem alivio de sua dôr lombar está habilitado ao trabalho e, de regra, se torna extremamente reconhecido.

RIASSUNTO

La correzione di difetti di posizione e di deformità ha recato giovamento a molti pazienti già curati perchè creduti affetti da malattie renali; ciò è stato notato in molti pazienti che non avevano avuto giovamento da cure urologiche.

I pazenti che consultano il medico per dolori al dorso debbono essere esaminati completamente, allo scopo di identificare con precisione la causa delle loro sofferenze. Una storia accurata spesso dà modo di scoprire un'antico trauma o una frattura del dorso o degli arti, cui possono essere imputati i disturbi.

Secondo l'Autore, una persona che conduca una vita sedentaria può andare soggetta a dolori dorsali allo stesso modo di un lavatore. Dopo un'accurato esame, condotto con mezzi clinici e con ogni altro mezo diagnostico a dispozione del medico, si può essere in grado di dire se il paziente ha una malattia urologica o no.

L'Autore ha trovato molto utile per la diagnosi la consultazione col reparto di medicina fisica e do ortopedia. Un paziente che sia stato liberato dai suoi dolori dorsali può dedicarsi a qualsiasi utile lavoro ed è, di solito, estremamente riconoscente.

The Preoperative Diagnosis of Gaseous Inflammations in the "Acute Abdomen"

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CHICAGO

IN recent years more and more emphasis has been placed on the use of the "scout" abdominal film in the differentiation of acute abdominal conditions.[1] Often a clinical picture remains obscure in spite of a complete history and complete physical and laboratory examinations. As examples one may cite the common clinical observation of pathologic conditions of the urinary tract presenting abdominal symptoms which are more characteristic of acute gastrointestinal disorders (sudden severe pain, tenderness, nausea, vomiting, constipation, diarrhea), or that of a reflex ileus complicating lobar pneumonia, under which circumstances the ileus may dominate the clinical scene to the extent that the causative pathologic condition remains unrecognized.

It is the "scout film" that often focuses the clinician's attention on the site of the pathologic change. The ease with which this diagnostic aid may be obtained should encourage its routine use in any preliminary study of disease involving the digestive, the urinary, or even the respiratory system. The roentgenologist analyzes the scout film to obtain information mainly with respect to the following points: size, shape and site of the visible organs; concretions in the kidneys, the gallbladder or other viscera; gas patterns of the gastrointestinal tract; soft tissue masses with or without calcifications; calcified blood vessels, and fluid accumulations. In this enumeration we have omitted accumulations of gas that have escaped from the confines of the gastrointestinal tube into the peritoneal cavity and which, under proper positioning of the patient, can be seen below the domes of the diaphragm. The presence of free air in the peritoneal space as a result of its introduction through abdominal surgical procedures, tubal insufflation or other artificial means is, of course, explained by the history and therefore should not offer any diagnostic problem.

It is not always simple or easy to differentiate the common roentgenographic signs on the preliminary abdominal film. Even a wide experience is often not enough to save the roentgenologist from confusing a gas-distended coil of small bowel with a segment of the colon. However, these are not the difficulties with which this presentation is meant to deal. Our aim is to focus attention on specific, definite accumulations of gas in unusual places as they occasionally appear on the so-called abdominal scout film. A correct interpretation of these rather unusual translucencies depends, surely, upon an evaluation of the complete clinical picture. Experience has shown, however, that the scout film may be the only means by which the pathologic condition is disclosed and localized.

REPORT OF CASES

CASE 1.—E. B., a white man 68 years of age, was first admitted to the hospital on Nov. 16, 1949. He was known to be diabetic and for the past six years had been taking 15 units of insulin daily. His complaint at the time of admission was sudden pain in the right shoulder for five days.

On admission the temperature was 100.3 F., and the only other essential signs were swelling, redness, tenderness and increased

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Submitted for publication August 14, 1952.

local heat over the right shoulder. The laboratory studies revealed sugar in the urine, and an occasional leukocyte. There was leukocytosis, the white cell count being 17,250 per cubic millimeter of blood, with 66 per cent polymorphonuclears and a fasting blood sugar value of 359 mg. Roentgen examination revealed calcareous bursitis and hypertrophic osteitis of the bones forming the right shoulder joint. After changing to a mixture of regular and protamine insulin and obtaining a lowering of the blood sugar level, the patient was operated upon. The bursa was opened and the sac removed. The symptoms rapidly subsided. A culture from the removed contents proved sterile. Six weeks later the patient was readmitted to the hospital because of headache, fever and anuria. The urologic consultant inserted a retention catheter, after which the temperature became normal. On the basis of cystoscopic and roentgenologic examination, a diagnosis of diverticulum of the bladder with calculus and hypertrophied prostate was made.

With the region under spinal anesthesia, a transurethral resection of the prostate was performed. After the operation the patient had a persistent, low-grade fever. The urine on three examinations showed albumin, no sugar, no acetone and 10 to 20 leukocytes per high power field. On the day following the operation the white cell count increased to 32,300 per cubic millimeter of blood, and four days later it was still 21,000. A culture of the urine revealed Staphylococcus aureus haemolyticus. The patient was discharged on Jan. 27, 1950. He received sulfonamides and subsequently penicillin orally because of the persistent fever and leukocytosis.

He was readmitted on March 5 because of a pain in the right side of the back, extending from the lower part of the thorax to the ipsilateral buttock. There was no dysuria or anuria. Physical examination at the time revealed diffuse tenderness over the right side of the abdomen and the right lumbar region. Three days later the pain was definitely localized in the right flank. On March 8 and 9 the roentgen data were as follows:

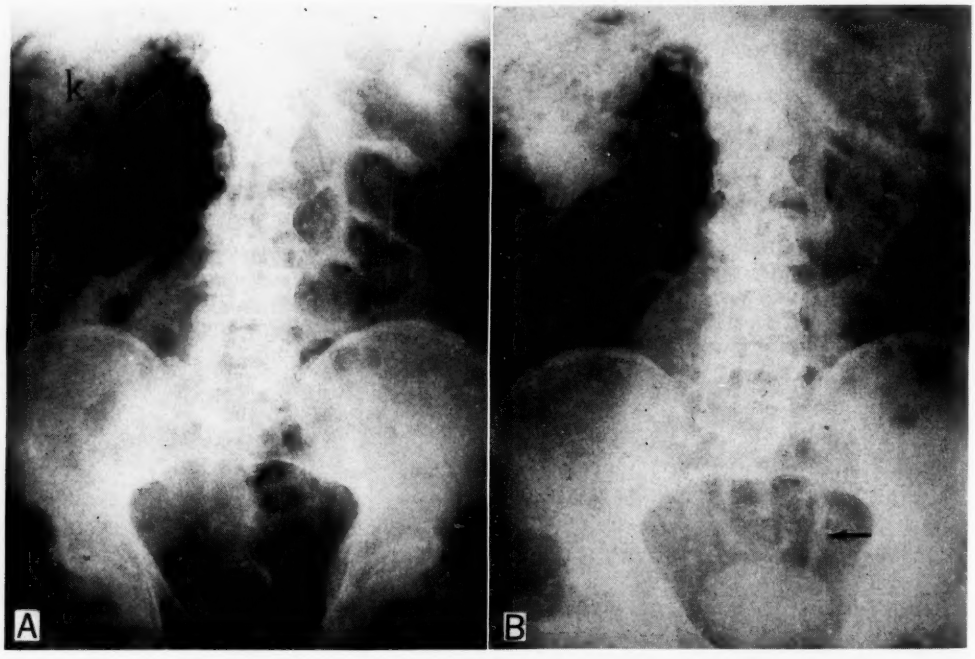

Fig. 1.—*A*, scout film of abdomen (supine position) taken on March 8, 1950. Note huge, round gas shadow in right upper quadrant surrounding mottled, irregular kidney density. (*K*) *B*, intravenous urogram taken March 9, 1950. No diodrast excretion on right side fifty minutes after injection. Slightly distended left ureter (arrow).

Examination of the urinary tract by scout films (Fig. 1*A*) and intravenous urographic study (Fig. 1*B*) revealed a round, cocoanut-sized, gas-filled, cystlike structure located in the right lumbar region, below the liver and in the posterior half of the abdominal cavity. Within the highly translucent area a rather dense soft tissue shadow was demonstrated, which, because of its size, shape and site, was assumed to represent the right kidney. It looked as if a somewhat irregularly outlined kidney were enclosed in a huge gas-containing abscess cavity. However, on some exposures the largest area of translucency presented a pattern resembling intestinal structures. In the neighborhood of the translucent area a few gas-containing loops of small bowel were constantly noted, while no trace of the right half of the colon could be found in the iliac fossa. The transverse colon and several loops of small bowel in the left lumbar region were distended with gas. On the lateral projection no communication between the aforedescribed gas bubble and the anteriorly located structures could be established. The right psoas muscle was obscured by the superimposed gas, while the left one presented a smooth and straight outline. A calcification the size of a coffee bean, suggestive of a urinary concretion in the lower part of the ureter, was observed in the right small pelvis. The contrast medium was concentrated and eliminated by the left kidney within normal time limits and cast a faint shadow of the renal pelvis. The calyces were obscured by the interfering bowel pattern. The left ureter was slightly dilated but was not markedly obstructed. None of the urinary structures of the right side were visualized by the contrast medium.

Conclusions.—1. *Nonfunctioning right kidney.* 2. *Suggested urinary calculus in the right lower ureter.* 3. *Unidentified gas-containing structure in the right posterior lumbar region, in close relation to the right kidney. This structure most probably represents a perinephritic abscess.*

Retrograde urographic study and gastrointestinal examinations were recommended.

Two days later retrograde urographic study (Fig. 2; Fig. 3, *A* and *B*) and stereographic scout films revealed a catheter inserted up to the level of the second lumbar vertebra and projecting into the well delineated gas-distended cavity surrounding the right kidney. Upon injection of the dye the kidney pelvis and calyces were not visualized.

Fig. 2.—Urogram taken March 11, 1950. Tip of ureteral catheter coiled in right kidney.

The contrast medium flowed back into the urinary bladder.

Conclusion: Gas-filled perinephritic abscess.

On March 12 the patient showed definite jaundice. In spite of this he was operated on and a perinephritic abscess was incised on the following day. The surgical description stated that, when Gerota's capsule was cut through, the sound of escaping gas was heard. Thick, foul-smelling, purulent material poured from the incision. Culture of this material grew paracolon bacilli. Sensitivity tests revealed nonsensitivity to streptomycin, 1 plus sensitivity to aureomycin and 3 plus sensitivity to chloromycetin. The white blood cell count dropped from 28,200 per cubic millimeter on March 6 to 7,500 on March 25. Under chloromycetin therapy, the patient became rapidly afebrile and improved to the extent that he was able to be discharged on April 3, two days after a final intravenous urographic study (Fig. 4) had revealed a marked change of conditions in the right lumbar region. The kidney shadow and the large accumulation of gas around it had disappeared. The area was now occupied by irregular soft tissue structures and by residue of gas, of about the volume of an apple.

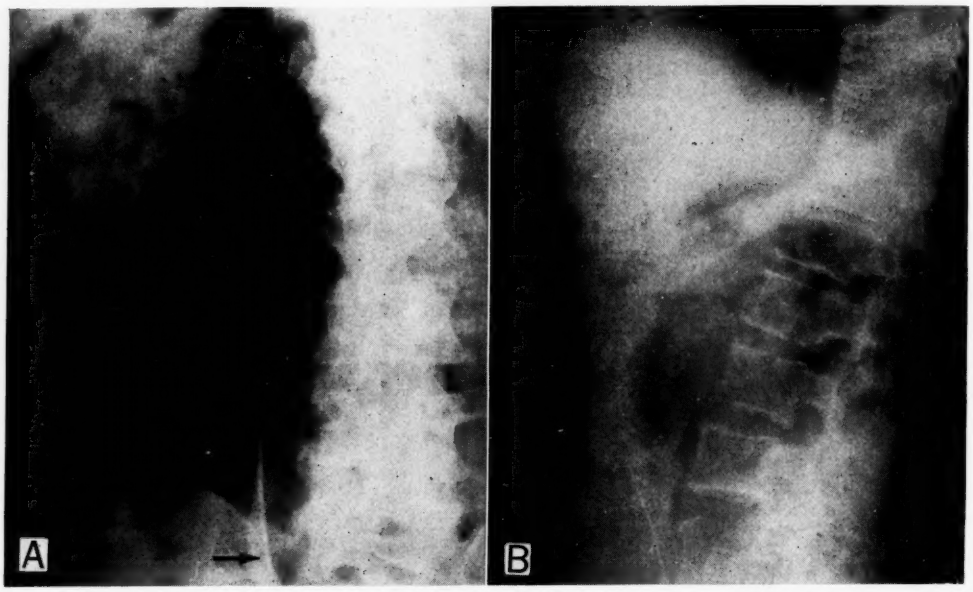

Fig. 3.—*A*, retrograde urogram taken March 11, 1950. Reflux of contrast medium (arrow) without visualization of renal pelvis. *B*, lateral view (same date) demonstrating posterior portion of gas-containing perinephric abscess displacing the intra-ureteral catheter anteriorly.

There was no evidence of urinary function on the right side.

Conclusions: 1. *Status after surgical drainage of a right perirenal abscess.* 2. *Absence of the right kidney.* 3. *Normally functioning left kidney.*

CASE 2.—E. E., a white man aged 51, was admitted to the hospital on Sept. 14, 1949, with a history of severe intermittent pain in the epigastrium and right upper abdominal quadrant, of two days' duration. There was no associated nausea or vomiting. The patient's appetite remained good, and he continued to work during the first two days of his illness. He denied having had any previous abdominal distress or digestive disturbance, beyond a single episode of heartburn. He was first seen on the third day of his illness, when the essential physical signs consisted of marked tenderness and rigidity in the right hypochondrium, with a suggestion of a mass corresponding to the location of the gallbladder. Upon admission to the hospital he became febrile and had a chill. Roentgenologic examination of the chest, a scout film of the abdomen and an electrocardiogram were made. No pulmonary or cardio-aortic abnormalities were revealed.

Examination of the abdomen by a scout film (Fig. 5) and a separate exposure of the right hypochondrium revealed a moderate amount of gas in the hepatic flexure of the colon and, somewhat laterally and above it, an isolated, plum-sized air bubble which was believed to represent part of the hepatic flexure. Cholecystographic study and a barium enema, to rule out the possibility of a gas-filled gallbladder or an intestinal diverticulum, were recommended.

The white blood cell count was 12,850 per cubic millimeter, with 78 per cent polymorphonuclear cells. The urine showed only a slight trace of acetone. The temperature climbed to 102 F. on the morning of the third day, at which time the patient had a severe chill. On the basis of the clinical course and the roentgenologic observations, he was operated upon the same day. At operation a gangrenous, distended gallbladder was revealed. A cholecystotomy was performed. The viscus contained pus, gas and three bile pigment stones, one of which was impacted in the neck of the gallbladder. Owing to a mishap, the material recovered from the gallbladder did not reach the laboratory, so that a culture could not be made. A mushroom

catheter was inserted for drainage. A postoperative scout film of the abdomen revealed the absence of the previously described gas shadow in the upper right abdominal quadrant. The patient left the hospital on the twenty-fifth day, after a stormy postoperative course.

CASE 3.—B. W., a white woman aged 63, was admitted to the hospital on Jan. 2, 1949, with the chief complaint of frequent watery bowel movements, fever and vomiting of two days' duration. The physical signs, aside from the elevated temperature and the increased pulse rate, were those of mild dehydration. The abdomen was soft. There was no tenderness, no masses, no increased resistance. The bowel sounds were normal. On the same day, mild, constant pain developed in the right upper abdominal quadrant. A scout film examination of the abdomen and a cholecystographic study revealed a group of faceted concretions surrounded by a pear-shaped translucent area representing a gas-filled gallbladder (Fig. 6*A*). With the patient in an upright position, the biliary calculi were seen accumulated at the bottom of the viscus. The

Fig. 5.—Gas-containing gallbladder; gangrenous cholecystitis. (Confirmed at operation).

Fig. 4.—Postoperative intravenous urogram (April 3, 1950) showing contrast medium in left ureter. Right kidney absent.

lower half of the gallbladder appeared to be filled with fluid and the upper half with gas (Fig. 6*B*). The colon and a few small bowel loops contained a moderate amount of gas. There was, however, no evidence of appreciable intestinal obstruction. An orally administered contrast medium failed to produce visualization of the gallbladder.

Conclusion: Cholelithiasis and emphysema of the gallbladder, suggesting an infection caused by a gas-producing micro-organism.

The white blood cell count on January 3 was 12,650 per cubic millimeter, with 92 per cent polymorphonuclear cells. The urinalysis showed only a trace of albumin. The icteric index was 12.6 units. Roentgen studies of the gastrointestinal tract resulted in the following data:

The stomach revealed nothing unusual. The barium meal entered the duodenum quickly under regular gastric peristalsis. The duodenal bulb was unusually wide and was completely filled with the barium, with the pa-

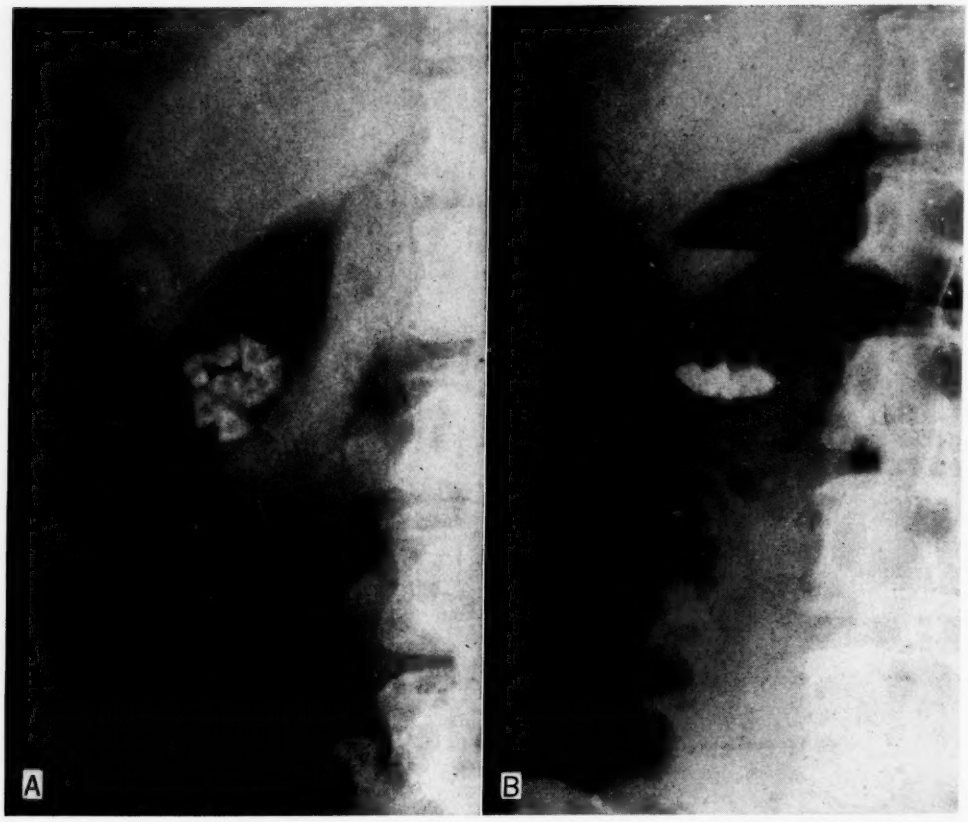

Fig. 6.—Scout films of right upper abdominal quadrant, taken Jan. 2, 1949. Gallbladder filled with gas, fluid and concretions. *A*, prone position; *B*, erect position, showing fluid level.

tient in the recumbent position only (Fig. 7*A*). When the patient stood up, the contrast medium occupied the lower half of the bulb, while the upper half was filled with gas (Fig. 7*B*). The gas cap above the barium level was in close relation with the large gas bubble demonstrated in the gallbladder, and, while there may have been a communication between the two structures, it was not possible to force the barium from the duodenum into the gallbladder. The descending portion of the duodenum revealed a large diverticulum at its mesenteric margin (Fig. 8*A*). The duodenal loop was wide. The transit of the contrast meal through the entire gastrointestinal tract took place in regular time.

The colon revealed a great number of diverticula in the ascending, transverse and descending sectors. There was no communication between the colon and the gallbladder.

Conclusions.—1. *Emphysema of the gallbladder, probably caused by a small cholecystoduodenal fistula.* 2. *Cholelithiasis.* 3. *Diverticulosis of the duodenum and of the colon.* 4. *No evidence of a biliary calculus in the gastrointestinal tract.* 5. *No evidence of a cholecystointestinal fistula.*

The patient was operated on one week after admission. On an attempt to expose the gallbladder, a large abscess cavity was entered, containing foul-smelling gas and eight biliary concretions. The cavity proved to be the gallbladder, the walls of which were necrotic and friable, with scattered areas of gangrene. There was no cholecystoduodenal fistula. The culture of the pus revealed Bacillus coli and Staphylococcus. Reexamination of the upper part of the gastrointestinal

tract on January 24 revealed absence of biliary calculi and of the emphysematous gallbladder seen preoperatively. The duodenal bulb was wide, and a large diverticulum was demonstrated in the descending portion of the duodenum (Fig. 8*B*). The patient made an uneventful recovery and was discharged on January 30.

COMMENT

Accumulation of gas in the perirenal space usually occurs in one of the following ways: (1) traumatic penetration of the perinephric space from the outside, (2) perforation of an abscess in the vicinity of the kidney produced by gas-forming organisms, or (3) infection within the cortex of the kidney spreading into the perinephric space, usually by way of the lymphatics.

While perirenal abscesses occur quite often and the surgeon frequently finds gas escaping along with the pus, the preoperative roentgenographic demonstration of gas in the perirenal space has rarely been reported. Lloyd Kindall[2] reported a case of perirenal abscess with gas formation due to Friedlander's bacillus. An illustrative roentgenogram taken three days before operation showed "multiple areas of rarefaction due to gas and pus, giving mottled appearance in right flank with gas-filled colon overlying part of this area." At operation, upon incision, a large amount of odorless gas escaped from the wound.

It is the gas surrounding the kidney that is responsible for the distinct and striking radiolucency on the roentgen film. Because spontaneous accumulation of gas in the perirenal space is so rarely recognized roentgenographically, it follows that either the gas is present in insufficient amounts or under such low pressure as to be inconspicuous on the film, or the roentgen manifestations, if present, are mistaken for gas in the alimentary tract, particularly in the hepatic or splenic flexures of the colon. Actually, the presence of gas is the only direct evidence of perirenal abscess formation. Otherwise the roentgenologist depends entirely on such indirect signs as oblitera-

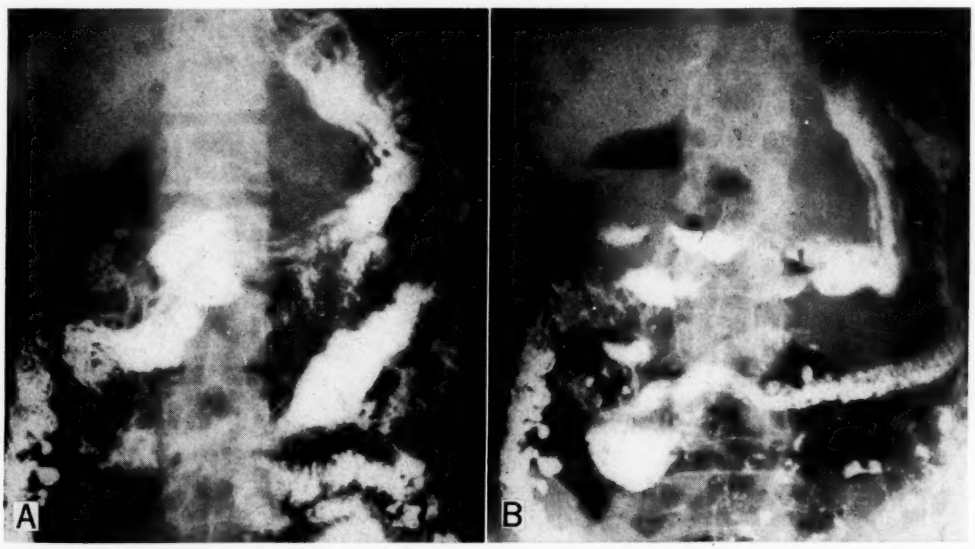

Fig. 7.—Films taken Jan. 3, 1949. In *A*, note completely unfolded duodenal bulb medial to gas-filled gallbladder. Oblong diverticulum of descending portion of duodenum. *B*, gas accumulations in gallbladder (above level of pus) and in duodenal cap (above barium level).

tion of the psoas muscle outline, elevation of the diaphragm, and curving of the lumbar portion of the spine. Perhaps emphysematous perinephritis would be more frequently diagnosed preoperatively if this possibility were kept in mind.

Gaseous or emphysematous cholecystitis as an autopsy observation was reported by Welch and Flexner as early as 1896.[3] Brutt in 1923[4] and Kirchmayr in 1925[5] described cases of gas gangrene of the gallbladder, recognized at the time of operation. In approximately 15 cases the condition is known to have been diagnosed preoperatively.

Since the pathogenesis of acute inflammation of the gallbladder wall is still largely theoretical[6] we prefer not to discuss this phase of the problem. Given the presence of gas-producing organisms, regardless of the path by which they reach the gallbladder, the sequence of pathologic changes is usually as follows:

1. Obstruction of the cystic duct by either bile, inspissated mucus, stones or pressure from the outside by lymph nodes, kinking, masses, etc.
2. Ischemia of the gallbladder wall.
3. Irritation of the gallbladder wall through physical or chemical trauma.
4. Actual bacterial invasion and gas formation in the devitalized area.

A number of bacteria have been identified as etiologic agents in this condition.[7] Rehfuss and Nelson[7b] state that Escherichia coli and Cl. perfringens were the most frequently encountered. Heifetz and Senturia[1h] included Cl. perfringens, Strep. faecalis, anaerobic spores, aerobic and anaerobic streptococci, Cl. filiforme, and the paracolon and bacteroides group of organisms.

The diagnosis of emphysematous cholecystitis can be made preoperatively only by roentgenographic evidence. An oval or pear-shaped radiolucent area, characteristic of gas projected on the right upper abdominal quadrant and corresponding in size, shape and location to the gallbladder, should immediately direct one's attention to the biliary system. Additional diagnostic evidence may be afforded by a horizontal fluid level if a film is taken with the patient in the vertical position.

If calcific densities are noted within the gas shadow, the roentgenologic appearance is so striking as to make a misinterpretation almost impossible. When this important clue is missing, the acumen of the diagnostician is more severely tested. A gas-filled duodenal bulb can be mistaken for emphysematous cholecystitis. Intubation will help make the differentiation. A barium meal or enema may be necessary to exclude fistulas between the intestines and the gallbladder or extrahepatic bile ducts. The gas, at least roentgenologically, is usually confined to the gallbladder. We have not seen gas in the rest of the biliary tract on a scout film of our own. In many instances, obstruction of the cystic duct by stones or inflammation, or both, will prevent the escape of gas from the gallbladder, and it is probably this circumstance which makes it possible for the gas to accumulate in sufficient quantity and under sufficient pressure to produce the characteristic well defined translucency. Considering the multitude and variety of gas-producing organisms associated with inflammation of the gallbladder, it seems strange that emphysematous cholecystitis should not be encountered more frequently; it is probable that the gas, if not trapped in the gallbladder, passes too rapidly through the biliary ducts into the intestines to be detected by the surgeon or the roentgenologist. It may be asked: Wherein lies the practical value of recognizing preoperatively this odd translucency for what it is? Are we overemphasizing the importance of this diagnostic sign in an age when the surgeon so ably demonstrates the existing condition surgically? We believe that the information obtained from a properly interpreted roentgenogram may be of decisive importance in two ways. First, as in the case of B. W., in which the clinical symptoms did not point to any particular diag-

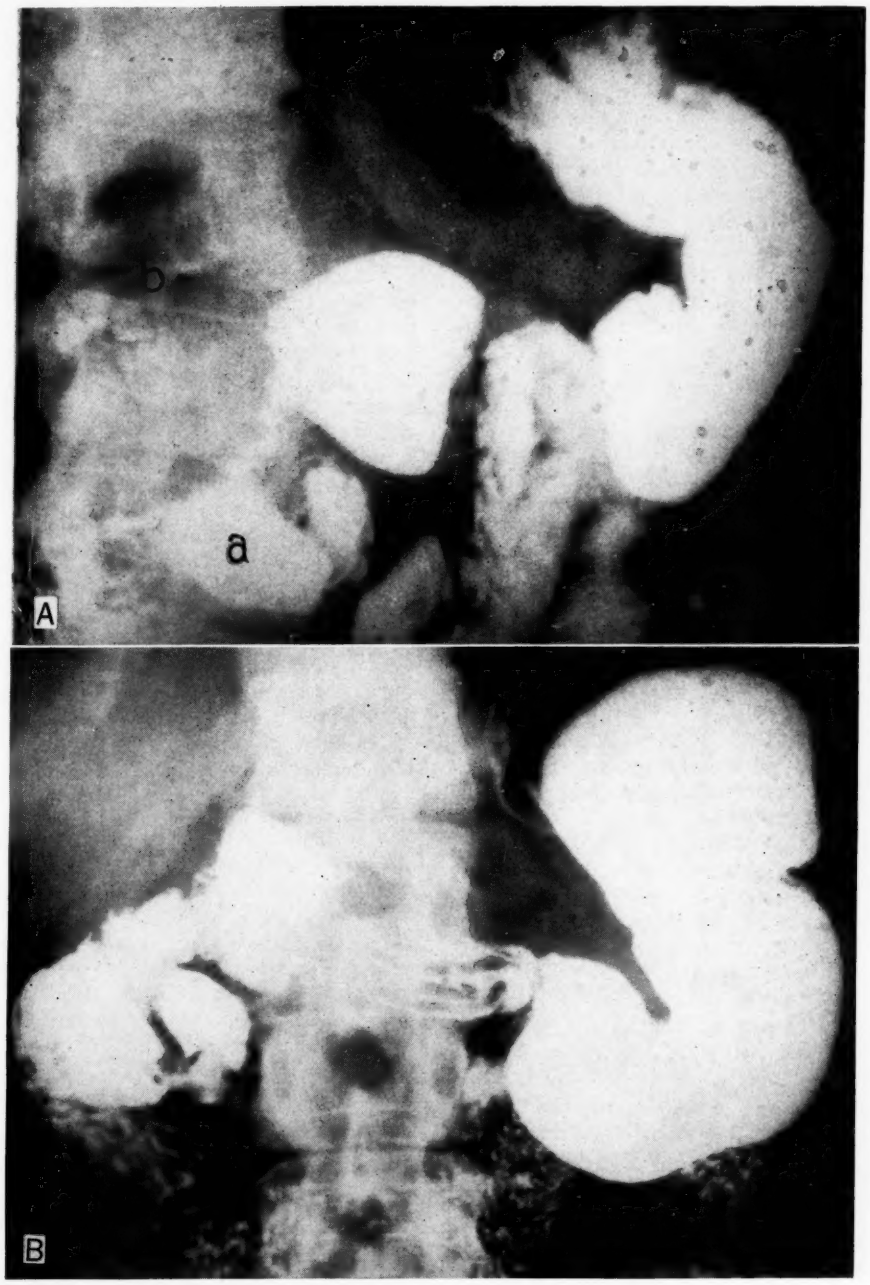

Fig. 8.—*A*, film taken Jan. 3, 1949. Oblique view, demonstrating large diverticulum at mesenteric margin of descending portion of duodenum (*a*) distinctly apart from gallbladder (*b*). *B*, postoperative view (Jan. 29, 1949). Note absence of biliary concretions and emphysema.

nosis, the roentgen evidence was the only sign that led directly to the organ involved and eliminated unnecessary and time-consuming procedures. Second, when the clinical symptoms and signs are such that a diagnosis of inflammation of the gallbladder is very probable, knowledge of the type of inflammation may be of the utmost importance to the surgeon. If one knows that one is dealing with a gaseous infection, immediate surgical intervention is indicated in preference to conservative management.[7d] In this we are upheld by Gowdey and Copeland,[1j] who consider operation the method of choice.

SUMMARY

Three cases are presented in which the proper interpretation of roentgen scout films of the abdomen showing abnormal gas accumulations led to a correct preoperative diagnosis in 2 cases of gaseous cholecystitis and 1 of perinephritis. The importance of routine scout films is reemphasized.

RESUMEN

Se presentan tres casos en los que la interpretación apropiada de röntgenogramas abdominales exploradores, mostrando acumulación gaseosa anormal, condujo a un diagnóstico preoperatorio correcto en 2 casos de colecistitis gaseosa y 1 de perinefritis. Se insiste en la importancia de la rutina de películas exploradoras.

RÉSUMÉ

Les auteurs insistent sur la nécessité d'une radiographie de l'abdomen comme moyen de diagnostic pré-opératoire.

Deux cas où il y avait distension gazeuse étaient une cholécystite gazeuse et un autre, une péri-néphrite.

ZUSAMMENFASSUNG

Es werden drei Faelle vorgestellt, in denen die richtige Deutung von Leeraufnahmen des Bauches, die anormale Gasansammlungen zeigten, zur korrekten praeoperativen Diagnose fuehrte. In zwei Faellen handelte es sich um eine emphysematoese Gallenblasenentzuendung und im dritten Falle um eine Perinephritis mit Gasbildung. Auf die Wichtigkeit routinemaessig vorgenommener Leeraufnahmen des Bauches wird von Neuem hingewiesen.

RIASSUNTO

Vengono presentati 3 casi nei quali una esatta interpretazione di radiografie esplorative dell'addome, che mostravano una anormale quantità di gas, condusse alla diagnosi esatta preoperatoria di colecistite gassosa (2 casi) e di perinefrite (1 caso).

Viene sottolineata l'importanza dell' esplorazione radiologica di routine.

SUMARIO

Tres casos são apresentados nos quais a propria interpretação de roentgenogramas simples do abdomen, mostrando acumulações de gas anormal levou ao diagnostico preoperatorio correto em 2 casos de colecistite gangrenosa e em 1 de perinefrite. A importancia do radiograma simples de rotina é realçada.

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Aneurysm of the Common Iliac Artery

Radical Treatment and Substitutive Venous Graft

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IN the surgical treatment of arterial aneurysms, the vascular graft after excision of the aneurysm has wider application that it formerly had, thanks to the perfecting of vascular suture technic, to the possibility of obtaining an efficient anticoagulative, and to chemotherapy and antibiotics. The advantages of this method as compared with palliative methods (simple ligation), so-called radical methods (multiple ligation, excision after ligation, obliterative endoaneurysmorrhaphy) or conservative methods (reconstructive endoaneurysmorrhaphy, lateral and terminoterminal suture, endoaneurysmal graft) are easily understandable, especially in cases of fusiform aneurysm.

The indications for surgical treatment of arterial aneurysms are so imperative that, according to Oberlin and Rouvillois,[1] only the poor condition of the patient and the dangerous or inaccessible situation of the lesion, as in a case of pelvic aneurysm, are to be considered contraindicative.

We have recently observed a case in which, according to such a statement, the anatomic site of the aneurysm might have been considered a contraindication to surgical treatment. In this case a large fusiform aneurysm of the left common iliac artery appeared without apparent cause in a man 53 years old, who had formerly suffered from bilateral varicose veins treated two years previously by total bilateral saphenectomy. Some five months before admission the patient noticed a pulsatile swelling in the left lower quadrant of the abdomen. He never complained of any functional impairment of the lower limbs. After admission (March 11, 1951) aortographic examination was twice carried out, but, although both roentgenograms gave us a clear vision of the abdominal aorta and its branches, they demonstrated nothing corresponding to the lesion. The Wassermann reaction was negative.

A diagnosis of aneurysm, probably of the left common iliac artery, was made. Surgical treatment was decided on, and operation was performed through a lateral oblique iliac incision. This revealed a voluminous sac (Fig. 1) the size of a lime, distended, pulsatile, wrapped in a considerable amount of sclerous connective tissue, situated on the common iliac artery and extending 1.5 cm. from the terminal portion of the aorta to the bifurcation of the iliac artery. Isolation of the aneurysm was particularly difficult until temporary hemostasis was effected with Blalock clamps on the aorta and the external iliac artery and a bulldog clamp on the internal iliac artery (Fig. 2). The ureter had to be carefully dissected from the aneurysmal sac, to which it was firmly bound by sclerous tissue. A periadventitial cleavage plane allowed us to excise the aneurysm *en bloc* (Fig. 3). The common iliac artery was sectioned 1.5 cm. from the aorta, the internal and external iliac arteries—flush with the sac. The iliac vein was normal and bore no pathologic relation to the aneurysm.

After excision of the sac the internal iliac artery was ligated, while the circulation between what remained of the common and external iliac arteries was restored by grafting about 8 cm. of the right superficial femoral vein, extracted at the time. The vein was heparinized and clamped by two bulldog clamps, and the direction of the valves was reversed (Fig. 4). The extension of the aneurysm hindered the possibility of a circular termino-

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Submitted for publication Feb. 14, 1952.

terminal arterial suture, a procedure suggested by Shumacker[2] in the presence of small aneurysms (maximum exeresis 3.5 cm.).

The suture technic (Fig. 5) was the same we had used with success in 2 previous cases of venous graft (for a surgical wound of the femoral artery and for segmental endarteritis obliterans): Blalock's everting suture with two lateral support stitches. The difference in caliber between the external iliac artery and the graft was practically negligible, and the anastomosis was easily performed. We had considerable difficulty, however, with the proximal anastomosis on account of the different calibers of the two vessels; when Blalock's clamp was removed a certain amount of leakage occurred, which obliged us to use some supplementary stitches. The graft proved permeable, although the blood flow was diminished on account of the noticeable reduction of caliber of the proximal anastomosis and of the graft, which was, with the subjacent external iliac artery, slightly pulsatile. The limb, which had remained for nearly five hours in complete ischemia, recovered its normal color and temperature in a short time.

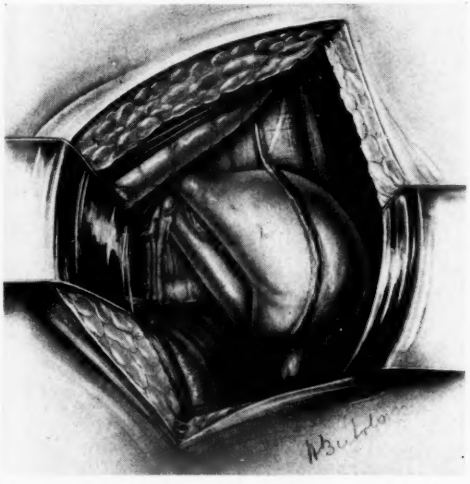

Fig. 1.—Aneurysm of left common iliac artery (see text). The sac shown was the size of a lime (the fruit) and was pulsatile. The aneurysm was removed *en bloc*.

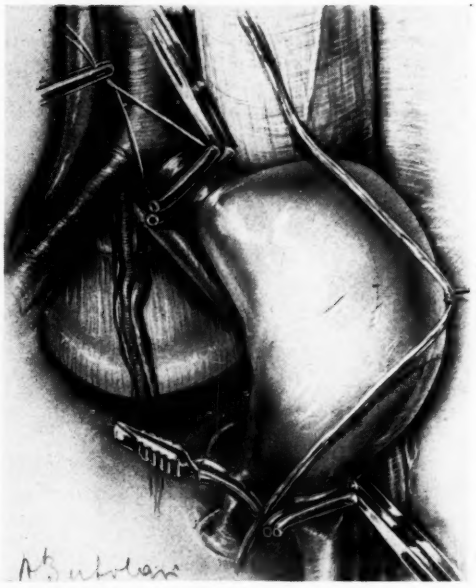

Fig. 2.—Technic of hemostasis. Blalock clamps were used on the aorta and the external iliac artery and a bulldog clamp on the internal iliac artery.

The operation was performed with the patient under general anesthesia with tracheal intubation (pentothal, curare, oxygen, nitrous oxide: anesthetist, Dr. Morgutti) and lasted about seven hours. The total amount of blood and saline solution given intravenously during the operation was 2,200 cc.; the total blood loss, about 2,000 cc.

Anticoagulative treatment, which was started at the beginning of the first anastomosis, was continued for five days with daily administration of 200 mg. of normal Choay heparin, followed by one injection of delayed Choay heparin and administration of 900 mg. of tromexan in twenty-four hours. The postoperative period was uneventful, and intense antibiotic therapy and blood transfusions proved extremely useful. When the stitches were removed a conspicuous amount of accumulated blood was evacu-

Fig. 3.—Aneurysmal sac after excision *en bloc*.

ated. The patient rose from bed on the fifteenth day; ambulation was normal and the trophism of the leg optimal. Three months after the operation, the patient did not complain of any disturbance; he had returned to his work in a metallurgic factory, and could not only walk but run without any inconvenience whatsoever.

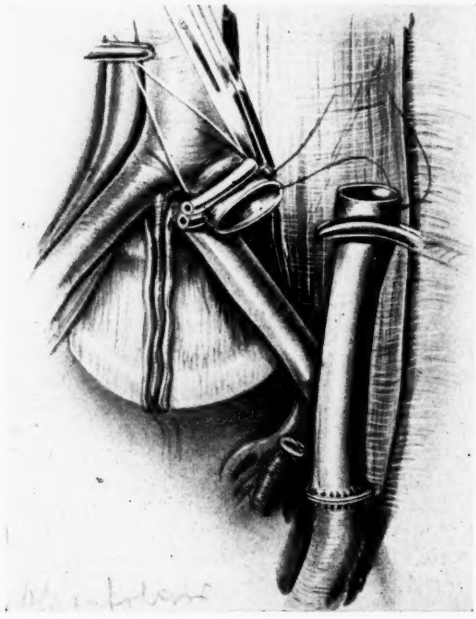

Fig. 4.—Technic of the venous graft after excision of the aneurysmal sac (see text).

At the same time, an aortographic control was done. The distal portion of the aorta was slightly curved and enlarged; the right common iliac artery was considerably enlarged and tortuous, and both the external and internal right iliac arteries were dilated and sinuous. The contrast of the mesenteric arteries was good, and there was slight ectasia of the arteries of the left side of the pelvis. In correspondence with the aortic bifurcation the contrast medium passed into the venous graft, which appeared to have a caliber of approximately 3 mm. and a length of 6 cm. Through this vessel the contrast medium passed to the external iliac artery after the first phase of circulation. A roentgenogram (Fig. 6) showed a greater filling up of the secondary arteries of the left half of the pelvis (especially the lumbar, the middle sacral and the left hemorrhoidal arteries) proving the existence of a collateral circulation which evidently completes the nutrition of the left leg. The circulation in all these

arteries is considerably slowed down.

The relatively modest number of cases in which aneurysm has been treated with venous graft has already been reviewed by one of us.[3] Arnulf[4] reported the observations of Goecke, Goyanes, Lexer, Omi (2 cases), Primgle and Tuffier. In these 7 cases there were aneurysms of the femoral or popliteal arteries, and treatment was successful in 5; Pirovano performed a venous graft in a case of aneurysm of the external iliac artery. Schumacker[2] operated on 3 patients, with excellent results in 2 and thrombosis of the graft in 1. Good results were also obtained by Krotoski[5] in a femoral and by Reboul[6] in a popliteal aneurysm. In both cases arteriographic controls were employed.

A venous graft has been used in the surgical treatment of arteriovenous aneurysms in a greater number of cases. It is worth while to remember the 8 cases reported by Abalos (5 recoveries) and the statistics of Warthmuller, who in 1917 reviewed 47 cases, in 40 of which the treatment was successful. Sensert in 1918 reported 5 cases (1 aneurysm of the common carotid, 1 of the axillary, 1 of the popliteal and 2 of the common femoral). More recently Blackmore and Lord obtained excellent results in 2 cases, and Schumacker[2] was successful in 2 cases out of 3. Also to be remembered are 1 case of Fontaine,[7] 7 cases of Rehn and Killian, 10 cases of Schneider and Batzner, 1 of Murray and others of Khenkin.

It certainly cannot be said that results are bad, in consideration of the limited experience surgeons still have with this condition. Nor has the venous graft to be considered an exceptional operation, especially with the aid of modern surgical technics and anticoagulative therapy. The case we have observed seems to us worthy of notice because the aneurysm was the first to be treated in Italy with a venous graft and because, if we do not err, no cases of aneurysm of the common iliac artery treated with this operative technic have been reported in the international literature.

From a general point of view we think it interesting to remember the recommendation of Leriche[8] not to choose operative technics that are safe only for

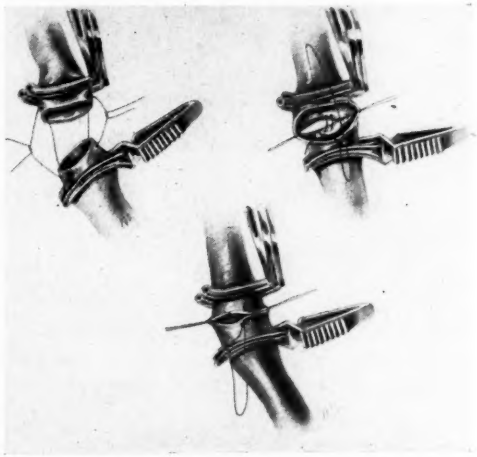

Fig. 5.—Suture technic: Blalock's everting suture with two lateral support stitches (see text).

Fig. 6.—Roentgenogram showing permeability of venous graft and greater filling of secondary arteries of left half of pelvis.

the surgeon and have small or great disadvantages to the patient. One must discard palliative or exclusively demolishing operations and chose conservative ones, or, better still, reconstructive ones, among which we believe the venous graft deserves preference.

SUMMARY

The authors report of case of voluminous fusiform aneurysm of the common iliac artery, treated with radical excision and by grafting 8 cm. of the superficial femoral vein. An excellent functional result was obtained, as shown by aortographic control after three months. The technical details are given.

RÉSUMÉ

L'auteur rapporte le cas d'un volumineux anévrysme de l'artère iliaque primitive qui a été traité par excision radicale et une greffe de la la veine fémorale d'une longueur de 8 cm. Les résultats furent excellents comme le prouve l'aortographie de contrôle faite trois mois après. La technique opératoire est décrite en détail.

RESUMEN

Se da a conocer un caso de aneurisma fusiforme voluminoso de la arteria ilíaca primitiva, tratado con excisión radical e injerto de 8 cm. de la vena femoral superficial. Se obtuvo excelente resultado funcional, con comprobación arteriográfica a los tres meses. Se consignan detalles técnicos.

ZUSAMMENFASSUNG

Die Verfasser berichten den Fall eines ausgevehnten spindelfoermigen Aneurysmas der A. iliaca communis, das mit radikaler Exzision und mit Einpflanzung eines acht Zentimeter langen Stueckes der oberflaechlichen Oberschenkelvene behandelt wurde. Der funktionelle Erfolg war ausgezeichnet und wurde nach drei Monaten durch Aortographie bestaetigt. Die technischen Einzelheiten werden beschrieben.

RIASSUNTO

Gli Autori riferiscono un caso di voluminoso aneurisma fusiforme dell'arteria iliaca comune, trattato con escisione radicale e contrapianto di vena femorale superficiale di 8 cm. di lunghezza. Si ottenne un eccellente risultato funzionale, con controllo aortografico dopo 3 mesi. Vengono forniti dettagli tecnici.

SUMARIO

Os autôres relatam um caso de volumôso aneurisma fusiforme da artéria iliaca comum tratado com excisão radical e com enxcêrto de 8 cms. de veia femural superficial. Um resultado funcional excelente foi obtido, com contrôle aortografico depois de 3 mezes. Detalhes technicos são dadōs.

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Evaluation of the Usefulness of Intravenous Sodium Seconal In Anesthesia

RUTH WEYL, M.D., WEI-CHI LIU, M.D. AND EVELYN LIPP, M.D.
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INTRAVENOUS induction of anesthesia with a barbiturate has been gaining favor rapidly during the past few years. The pleasant sensation experienced by the patient is well appreciated. The patient, however, is not aware of the ever-present danger of laryngospasm following the use of the thiobarbiturates. Since it is known that vagal activity is enhanced to a greater extent by the thiobarbiturates than by the oxygen-containing barbiturates[1] it seemed worth while to conduct a clinical study with sodium seconal as an intravenous hypnotic agent, with the hope of finding an agent that would achieve pleasant intravenous induction of general anesthesia without causing increased vagal stimulation, and, if possible, to establish a procedure to avoid respiratory depression and too long-lasting sedation.

Until quite recently, sodium seconal could not be used to advantage as an intravenous agent. Rapid decomposition made such use impractical. Sodium seconal was used, however, extensively in premedication given by mouth, and as a basal anesthetic agent administered rectally in children *prior to inhalation anesthesia*. Poe and Karp,[2] reporting on 100 cases of rectal administration, noticed no evidence of hypersensitivity to the drug. Adequate respiratory exchange was present in all their cases, in spite of relatively high doses. The method, however, is not flexible, and the shortcomings of either oral or rectal administration are obvious. Another important use of sodium seconal was to allay apprehension and to provide sedation during spinal anesthesia. Too often, however, patients premedicated orally became too drowsy to cooperate sufficiently in establishing the exact level of spinal anesthesia. Therefore, it seems desirable to be able to provide lasting sedation with a rapid acting intravenous barbiturate once the level of spinal analgesia has been established.

Since the advent of an improved solution of sodium seconal for intravenous use, the drug has been tried extensively in several clinics and satisfactory results have been reported.[3]

Stoelting and his co-workers[4] used it for hypnosis during nitrous oxide anesthesia. Virtue and Gootee,[3c] in experimental procedures, evaluated the respiratory response of cats to several barbiturates and thiobarbiturates. Like Stoelting, they used sodium seconal intravenously in man, satisfactorily, with nitrous oxide. To intubate patients orally, the technic of Carron[5] was used, that is, cocainization of the pharynx preceded injection of sodium seconal, which in turn was followed by injection of curare.

Bush and his co-workers[6] preceded their paper with a comparison of action and duration of hypnosis of therapeutic amounts of pentothal, seconal and barbital. His group administered sodium seconal as a hypnotic agent to supplement regional anesthesia and as a basal anesthetic agent used with all the common vapors and gases; they did not, as a rule, use curare preceding intubation, nor did they use cocainization. No mention is made as to what influenced these workers in the choice of the inhalation agent.

In the present study, sodium seconal was used in 270 adults as follows: As a basal anesthetic agent prior to inhalation

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Submitted for publication July 8, 1952.

anesthesia in all types of surgical procedures in 180 patients, and as an adjunct to spinal anesthesia in 90 patients. The youngest patient in this series was 15 years of age; the oldest was 82.

The Drug.—Sodium seconal is considered a short-acting barbiturate. Krantz, however, classified it as "ultra short-acting."[7] Therapeutic doses do not inhibit or modify normal hepatic or renal function. The drug is detoxified by the liver. It readily passes the placental barrier. The sodium salt of propyl-methyl-carbinallyl barbiturate prepared for intravenous administration* is fully stable in a polyethylene glycol 600 vehicle and fully miscible with water. Since the ethylene glycol polymers are excreted by the kidney, renal damage is considered a contraindication to the intravenous use of sodium seconal. One cc. of the liquid preparation supplied contains 50 mg. of sodium seconal. According to the manufacturer, and to Stoelting and his associates,[4] the drug can be used in this concentrated solution without causing local irritation or thrombosis.

We decided, however, to use a diluted solution to achieve greater flexibility of administration. Very slow injection seemed desirable to permit adequate evaluation of the immediate effect of the drug, and to avoid a fall in blood pressure as well as nausea and vomiting, so easily caused by too rapid injection of any potent intravenous agent. Therefore, without exception, a routine dilution to one-fourth of the original potency was used. In no instance was irritation at the site of injection noted, not even when slight spillage occurred.

Technic.—The patients were seen preoperatively and premedicated moderately, according to age and general condition, with morphine sulfate and atropine sulfate or scopolamine hydrobromide in the ratio 1:25, administered subcutaneously ninety minutes before the operation.

General Anesthesia.—Two hundred and fifty mg. of the drug was prepared for each patient by diluting 5 cc. of the supplied preparation with 15 cc. of physiologic solution of sodium-chloride. To induce general anesthesia, the drug was slowly injected intravenously while the patient was asked to count or talk. Injection was stopped when loss of the lid reflex was noted. By this time usually from 200 to 250 mg. had been injected. No further injection was made. Pure oxygen was supplied for one minute by bag and mask, and the patient was watched carefully in order to evaluate the full effect of the drug. Then the inhalation of the principal anesthetic agent was started. The choice of this agent was based on the observed effect of the injected seconal. If a patient was in lower first plane two or three minutes after the injection of sodium seconal had been started, nitrous oxide or ethylene was chosen as the main anesthetic agent, administered with oxygen at a ratio of 3:1 by the semiclosed absorption technic, followed by maintenance with a 2:1 ratio. If swallowing was noted after the injection was completed or roving of the eyeballs seemed excessive, the patient received cyclopropane as the principal anesthetic agent by the closed absorption technic, sometimes with a small amount of ether added to stimulate respiration. It was most impressive to see how well any anesthetic agent was tolerated and how much less of it was required. Excellent masseter relaxation was present after a few minutes in all cases, and a pharyngeal airway could be easily introduced.

Curare was used routinely whenever tracheal intubation was planned or when abdominal relaxation had to be provided. Since there seemed to be a definite synergistic action between curare and sodium seconal to the effect that still less of the gaseous agent was needed to maintain adequate anesthesia, curare was employed in some prolonged cases for this effect only.

D-Tubocurarinechloride, Mecostrin (D-Tubocurarine dimethyl ether chloride),

*Sodium seconal was supplied through the courtesy of Eli Lilly Research Laboratories.

and Flaxedil were the curare preparations used. The doses used were 20 to 60 units of the D-Tubocurarine chloride preparations or 20 to 60 mg. of Flaxedil. As a rule the relaxing drug was injected after the injection of sodium seconal had been completed and inhalation anesthesia established; in many instances, however, the calculated amount of curare was added to the sodium seconal in the same syringe and injected simultaneously, with good results.

Variations.—In one case in which a mask could not be applied to the face of the patient because of the condition of the left eye (extreme protrusio bulbi in a patient with brain tumor, scheduled for skin graft for extensive burns), orotracheal intubation was performed, only sodium seconal (250 mg.) and D-tubocurarine chloride (60 units) being used. Anesthesia was then maintained with a small amount of cyclopropane. Intubation was easy and nontraumatic, and this technic can probably be used in experienced hands whenever rapid intubation is desired. There were other changes from the described routine. In 2 elderly patients 100 mg. of sodium seconal was sufficient initially to produce first plane anesthesia. Nitrous oxide inhalation was started and transurethral resection begun. During the two-hour procedure, however, the remaining 150 mg. of sodium seconal had to be injected in small doses to keep the patients adequately anesthesized. Only in 3 instances was more than 250 mg. of sodium seconal used. One was a brain operation; the other two were laminectomies, the electric knife being used during these three operations. All 3 patients were intubated. Small additional doses of sodium seconal were injected (to a total of 325 mg., starting with an initial injection of 250 mg.) to maintain first plane anesthesia with nitrous oxide and small doses of curare for several hours.

In no case was sodium seconal used as the only anesthetic agent. The drug was not used in operations lasting less than half an hour except in 2 cases, to be described later. In cesarean section it was used only after delivery of the baby. Kidney damage was considered a contraindication.

Supportive measures were instituted, as with other anesthetic agents, according to the condition of the patient and the nature of the operation.

Very early in this series it became obvious that it was important not to start any operative procedure before the patient was adequately saturated with the principal anesthetic agent. Another important consideration was to administer the smallest amount possible of cyclopropane and/or ether, if these were the inhalation agents, to reach and maintain the plane of anesthesia required for the surgical procedure; and to maintain these patients with ethylene or nitrous oxide toward the end of the operation. Only if such care is taken can prolonged postoperative somnolence be avoided.

Spinal Anesthesia.—Small amounts of sodium seconal (50 to 100 mg.) were injected at intervals to achieve sedation in apprehensive patients with adequate spinal analgesia or for relief of discomfort when spinal analgesia was inadequate or wearing off. Nausea occurring under spinal analgesia was another indication for administering the drug. The amount used varied from 50 to 400 mg., the average being 100 mg. The amount of 400mg. was used only once in a patient undergoing gastric resection under continuous spinal analgesia. It was administered in divided doses of 100 mg. during the four-hour operation. (A similar large amount was given to supplement the effect of a brachial plexus block during a four-hour operation. The patient was awake and comfortable during the procedure.)

Results. — The drug proved entirely satisfactory in 246 patients. Smooth induction, adequate respiratory exchange, and prompt awakening were present in 164 patients under general anesthesia. Excellent relaxation of the jaw made early introduction of a pharyngeal airway possible. Atraumatic orotracheal intubation was achieved easily in 40 pa-

tients without using preliminary local anesthesia of the pharynx and larynx. All these intubations were planned, the nature of the operation or the position of the patient on the table making intubation desirable. There was no instance of "emergency" intubation in this series.

Adequate sedation without respiratory depression or vomiting was supplied under spinal anesthesia in 82 patients. Nausea occurring during spinal anesthesia was controlled successfully in 4 patients and headache in 2.

While we made it a rule not to administer sodium seconal for any operation lasting less than half an hour, to take full advantage of the properties of the drug, and at the same time to be able to watch the patient during the time of the expected depression, we administered sodium seconal to 2 young healthy patients, as a clinical experiment, for dilatation and curettage, each lasting fifteen minutes. The patients, aged 30 and 34 respectively, were given 250 mg. of sodium seconal followed by ethylene inhalation. Both patients were awake on the table at completion of the operation.

There were 3 postoperative deaths in this series. The first was that of a 42-year-old woman whose anesthetic course had been very smooth during and after the performance of a vaginal hysterectomy with general anesthesia. She went into convulsions on the third postoperative day. Later she complained of severe headache, and stiffness of the neck was noted. Death occurred on the tenth postoperative day. The clinical diagnosis of subarachnoidal hemorrhage was confirmed by postmortem examination and judged to be due to congenital aneurysm. The second death was that of a 56-year-old woman who had been scheduled for a biopsy of the lung. Induction with sodium seconal and cyclopropane was uneventful. The patient was intubated satisfactorily and turned on her side; respiratory exchange seemed adequate. When the pleura was opened, an abrupt fall in blood pressure occurred, with disappearance of the peripheral pulse. Inflation of the lungs with intermittent positive pressure seemed difficult; definite resistance was felt. Use of vasopressor drugs, blood and plasma eventually restored the blood pressure to the preoperative level. The patient was allowed to breathe "on her own," with assistance, and the operation could be completed. The patient was in control of her reflexes when leaving the operation room and talked intelligently a little later. Subsequently she became cyanotic, her blood pressure could not be maintained adequately and she died suddenly that same evening, fully conscious.

Postmortem examination showed linitis plastica of the stomach, with generalized metastasis to the lungs, the pancreas, the omentum, the lymph nodes, and the left kidney. There was a pulmonary embolus to the right middle lobe. The alveolar epithelium was necrotic in most places; lymphatics of the lungs were filled with aplastic cells, forming clumps, and some small blood vessels were filled with organizing thrombi, others with cells. Obviously there was very little functioning lung tissue left, and the collapse of one lung could not be tolerated.

The third death occurred in a 63-year-old patient with chronic emphysema and bronchitis who underwent abdominoperineal resection under spinal anesthesia. One hundred mg. of sodium seconal was administered in divided doses. The course on the table was entirely satisfactory; postoperatively there developed viral pneumonitis, and the patient had to be operated on one week later for intestinal obstruction due to internal herniation. No sodium seconal or spinal anesthesia was used during the second operation. The patient died a few days later.

Complications.—There was one case of postoperative atelectasis in this series that responded well to treatment. The patient, 54 years old and alcoholic, received spinal anesthesia for cholecystectomy and repair of a diaphragmatic hernia. The patient was very apprehensive and received and needed 100 mg. of Demerol in divided doses and 150 mg. of sodium seconal during the first hour of the operation. After

one hour, additional anesthesia had to be administered, and C_3H_6 was chosen. The patient was awake at completion of the operation. We might mention here that another alcoholic patient, a 43-year-old man suffering from delirium tremens, ran a very smooth anesthetic and postoperative course. The operation was repair of an inguinal hernia, the anesthetic 250 mg. of sodium seconal followed by inhalation of cyclopropane.

There was 1 case of apnea, and 5 cases of respiratory depression. The apnea occurred in a patient under high spinal anesthesia (for cholecystectomy), when 100 mg. of sodium seconal was given intravenously, exactly seventy-five minutes after the premedication had been injected subcutaneously. Artificial respiration by bag and mask using 100 per cent oxygen had to be administered for two minutes, after which time spontaneous adequate respirations were assumed. One patient showed signs of respiratory depression under similar circumstances. The respiratory depression occurring with general anesthesia was slight in all 4 cases. It followed the administration of C_3H_6 or C_3H_6 and curare. In 1 patient the depression occurred after sodium seconal (250 mg.) and mecostrin (60 units) had been given, before inhalation anesthesia was started. Assisted respiration for a few minutes proved satisfactory.

In the beginning of this series 2 patients slept for several hours after completion of the operation. They were in possession of their pharyngeal and laryngeal reflexes and could be aroused. But they were drowsy and went back to sleep. Subsequent course was uneventful.

Laryngospasm: In 1 patient a cough and partial laryngospasm developed when cyclopropane inhalation was started after sodium seconal injection. This was relieved immediately by intravenous injection of 50 mg. of trasentin.

Slight partial laryngospasm in a patient under sodium seconal and ethylene anesthesia during vaginal hysterectomy was overcome by deepening the anesthesia by changing to cyclopropane.

Mild laryngospasm occurred in a male patient aged 30, when the laryngoscope was inserted using sodium seconal (200 mg.), ethylene and mecostrin. Successful intubation was accomplished and the patient maintained with C_3H_6 and minimal amounts of ether. There was no bucking.

Abnormalities of Blood Pressure: There were 6 cases of hypotension, including the one mentioned before. Significant fall in blood pressure occurred in 1 elderly patient shortly after injection of the sodium seconal during manipulation of the hip prior to hip nailing. The drop was transient and was overcome by increasing the speed of the blood transfusion. The condition of the patient remained satisfactory during the rest of the operation. In 4 patients a fall in blood pressure developed at the end of prolonged operations under general anesthesia. Sodium seconal was probably contributory in 1 case, since a moderate fall in blood pressure occurred shortly after injection of sodium seconal. One of the 4 patients presented the picture of "cyclopropane shock" after a three-hour operation, although respirations had been assisted most of the time. The patient was awake and fully conscious ten minutes later and made an excellent recovery.

Belching was noted in 1 patient after the injection of 250 mg. of sodium seconal and 6 mg. of D-tubocurare before oxygen or inhalation anesthesia was started. The belching subsided soon, and there was an uneventful anesthetic course.

In 2 patients nausea and vomiting developed after the injection of small doses of sodium seconal during spinal analgesia. There was no case of nausea and vomiting following the injection of the drug in preparation of general anesthesia.

Three patients were restless and uncontrollable after receiving small doses of sodium seconal for sedation, while under spinal anesthesia. They had to be put to sleep with C_3H_6. Additional sodium seconal could have been given with satisfactory results, as later experiences proved.

SUMMARY AND CONCLUSIONS

The preparation of sodium seconal in polyethylene glycol for intravenous use proved to be satisfactory in our series as a hypnotic agent to supplement spinal anesthesia, and as a basal anesthetic agent used prior to inhalation anesthesia. Administration is simple and induction of general anesthesia is pleasant. Sodium seconal is compatible with curare preparations and can be used with the main inhalation anesthetic agents. In using it thus, it is important not to start any operative procedure before the patient is adequately saturated with the principal anesthetic agent. Cyclopropane and ether have to be used with good judgment to avoid postoperative somnolence. Excellent masseter muscle relaxation was obtained in all cases. No increased vagal stimulation was noted, and atraumatic easy intubation could be performed with the use of small amounts of curare.

As with other barbiturates, hypotension may occur and the blood pressure has to be watched carefully.

Injected intravenously, sodium seconal is a powerful hypnotic, and respiratory depression or apnea may be produced by the drug alone, especially after preoperative sedation. It should only be administered by an experienced anesthesiologist and only when facilities for assisted respiration are available.

SUMARIO

A preparação de seconal sodium em polyethylenio glycol para uso intravenoso provou ser satisfatoria em nossa estatistica como um agente hipnotico suplementar a anestesia raquidea e como um agente anestesico de base usado preliminarmente a anestesia por inhalação. A sua admnistração é simples e a indução para a anestesia gerel é agradavel. O seconal sodico é compativel com as preparaçõesde curare e pode ser usado com os agentes anesticos principais de inhalação. A ciclopropana e o ether deverão ser usados com bom criterio para se evitar sonolencia posoperatoria. Foi obtida excelente relaxação dos masseteres em todos os casos. Aumento de estimulo vagal não foi observado e intubação atraumatica facil poude ser executada com o uso de pequenas quantidades de curare. Como com outros barbituratos a hipotensão pode ocorrer e a pressão sanguinea devera ser olhada cuidadosamente.

Injetado intravenosamente o seconal sodico é um poderoso hipnotico e a depressão respiratoria ou apnea podem ser produzidas pela droga sozinha, especialmente depois de sedação preoperatoria. Ela deve ser somente admnistrada por um anestesiologista experimentado e somente quando existirem facilidades para respiração ajudada.

RESUMEN

Se considera satisfactoria la preparación de seconal sódico en glicol polietileno para uso intravenoso, como agente hipnótico complementario de la raquianalgesia, así como agente anestósico basal para usarse antes de la anestesia por inhalación. Se estima simple su administración y agradable su inducción para anestesia general. El seconal sódico es compatible con preparaciones de curare y puede usarse con los principales agentes anestésicos para inhalación. Debe usarse juiciosamente ciclopropano y éter para evitar somnolencia postoperatoria. En todos los caos se obtiene excelente relajación maseterina. No se notó estimulación vagal aumentada, pudiendo efectuarse intubación fácil y sin trauma con pequeñas cantidades de curare. Debe vigilarse cuidadosamente la presión sanguínea, dado que puede ocurrir hipotensión como en los demás barbitúricos.

El seconal sódico es un poderoso hipnótico inyectado intravenosamente, pudiéndose producir por dicha droga depresión respiratoria y apnea, especialmente después de sedación preoperatoria. Deberá administrarse solamente por un anestesista experimentado y sólo cuando se cuente con facilidades para atender a la respiración.

RÉSUMÉ

Le seconal sodium, dans le glycol polyéthylène, peut être employé comme anesthésique intraveineux, à la place de la rachi-anesthésie ou comme substance d'induction avant l'anesthésie par inhalation. L'auteur donne ensuite les précautions à suivre et la marche des manupulations. Il conclue en suggérant de ne laisser le produit que dans des mains expérimentées.

RIASSUNTO E CONCLUSIONI

La preparazione di seconal sodico in glicol polietilenico per uso endovenoso si è dimostrata soddisfacente come agente ipnotico aggiuntivo nelle anestesie spinali e come anestetico di base nelle anestesie per inalazione. La somministrazione è semplice e l'induzione della anestesia generale risulta piacevole. Il seconal sodico è compatibile con il curaro e può essere usato assieme ai principali agenti anestetici per inalazione. Nell'usarlo, tuttavia, è importante che lo intervento non venga iniziato fino a che il paziente non sia perfettamente saturato con l'agente anestetico principale.

Ciclopropano ed etere devono essere usati con criterio per evitare la sonnolenza post-operatoria. In ogni caso si ottenne un eccellente rilassamento della mandibola; non si ebbe a notare alcun aumento degli stimoli vagali e si potè eseguire facilmente la intubazione con l'uso di piccole quantità di curaro.

Come con gli altri barbiturici può verificarsi ipotensione, e la pressione sanguigna deve essere sorvegliata con cura.

Per via endovenosa il seconal sodico è un potente ipnotico; esso può produrre da solo depressione respiratoria e apnea, specie dopo premedicazione; deve quindi essere somministrato soltanto da un anestesista esperto e soltanto quando vi sia la possibilità di assistere la respirazione.

ZUSAMMENFASSUNG UND SCHLUSSFOLGERUNGEN

Seconalnatrium in Polyethylenglycol fuer intravenösen Gebrauch hat sich in der vorliegenden Serie als ein zufriedenstellendes Schlafmittel zur Unterstuetzung der spinalen Anaesthesie und als ein befriedigendes Anaesthetikum zur Einleitung von Inhalationsnarkosen erwiesen. Die Anwendung ist einfach, die Einleitung der Allgemeinnarkose wird als angenehm empfunden. Seconalnatrium vertraegt sich mit Kurarepraeparaten und kann gleichzeitig mit den zur Inhalationsnarkose verwendeten Hauptmedikamenten verabfolgt werden. In diesem Falle aber ist es wichtig, mit chirurgischen Eingriffen zu warten, bis der Kranke eine genuegende Zufuhr des Hauptnarkotikums erhalten hat. Cyclopropan und Aether muessen mit Umsicht und Zurueckhaltung angewandt werden, um eine postoperative Schlafsucht zu vermeiden. In allen Faellen trat eine ausgezeichnete Erschlaffung der Kaumuskeln ein. Es wurde keinerlei erhoehte Vagusreizung beobachtet, und die Intubation konnte unter Verwendung kleiner Mengen von Kurare leicht und ohne Trauma ausgefuehrt werden.

Blutdrucksenkung kann wie bei anderen Barbitursäurepraeparaten eintreten, und der Blutdruck muss daher sorgfaeltig beobachtet werden.

Intravenoes eingespritztes Seconalnatrium ist ein starkes Schlafmittel und kann von sich aus zu Depression der Atmung und zu Atemlosigkeit fuehren, besonders wenn vor der Operation Sedativa verabreicht wurden. Das Mittel sollte ausschliesslich von erfahrenen Anaesthesiologen und nur, wenn Vorrichtungen zur Unterstuetzung der Atmung zur Verfuegung stehen, verabreicht werden.

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Echoes of the Past

XXXI. THE ROLE OF ITALY IN THE FOUNDING OF FORENSIC MEDICINE

The Englishman Farr wrote in 1788 that "there is a kind of medical knowledge which is not so much concerned in the cure of disease as in the detection of error and the conviction of guilt." This medical knowledge has been termed medical jurisprudence, or legal or forensic medicine. It has been described as the science that applies knowledge of medicine to the requirements of law (J. J. Reese).

Forensic medicine was not developed in the early stages of civilization. The only ancient record resembling a treatise on the subject was written by Galen (131-201 A. D.) under the title "Simulation and Malingering." Definite notations on medicolegal matters, however, appear in the law collections of the Roman emperors Theodosius and Justinian, whose codes, including information on insanity, impotence and premature births, suggest that medical experts testified in the Roman courts.

It was not until the thirteenth century that a definite idea of forensic medicine was formulated. An edict of Pope Innocent III (1209) stated that inflicted wounds must be examined and an opinion given by a medical expert. Canon law also required medical experts in cases of impotence and leprosy.

The great Italian surgeon Hugh of Lucca became the medicolegal expert of Bologna (1249). Thereafter many pronouncements by Bolognese physicians were made. In 1302 Bartholomew da Varignana of Bologna performed a medicolegal autopsy. Another such autopsy is credited to William of Salicetto (1201-1280). These autopsies were among the first recorded.

Other cities in medieval Italy—Padua, Genoa, Mirandola, Bassano, Florence, Verona, Genoa, and others—followed Bologna's lead. During the sixteenth century the Italian city laws demanded the use of medical experts as a routine procedure and thus acknowledged the new science. A short treatise on medical testimony was written by Condronchi of Imola, Italy, in1597. The first real dissertation on the subject was published by Fortunatus Fidelis of Palermo. Fidelis discussed malpractice, in keeping with the tempo of the era; he wrote of the medical aspects of torture, prison organization, and petitions of dismissal for medical reasons.

Forensic medicine, therefore, arose in great measure from the Italian peninsula. toward the end of the seventeeth century, however, the Germans became the greatest exponents of medical jurisprudence and contributed most extensively to its advancement.

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Cardiac Arrest

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THE cessation of cardiac activity during any surgical procedure is an emergency demanding instant recognition and prompt treatment based on two factors: (1) adequate ventilation of the lungs with 100 per cent oxygen and (2) cardiac massage. Because of the rarity of the complication, many general surgeons and surgeons in the specialties have no prepared plan of activity; hence precious minutes are wasted in making the diagnosis and then in instituting treatment.

Lahey and Ruzicka[1] stated that the first death attributed to anesthesia occurred in 1848, one year after the introduction of ether. From the facts presented, this appears to have been a case of cardiac arrest. One hundred years later the problem is still present, but now a definite plan of treatment can be offered. Niehaus in 1889 made an unsuccessful attempt at cardiac resuscitation by manual massage. Starling and Lane reported the first successful case of resuscitation in 1902. Up to 1945 only 145 cases of cardiac arrest had been reported, but this year Stephenson[2] has collected 1,125 cases. Lahey[1] expressed the opinion that there is an increased consciousness of the problem and that surgeons and anesthetists are on the alert, which accounts for the greater number of cases reported. Hanks and Papper[3] reported an incidence of 0.057 per cent (8 cases) in 14,000 general anesthetics at Columbia Medical Center.

The fundamental factor requiring rapid treatment is the loss of oxygen supply to the cells of the body, particularly the brain, which is especially sensitive to oxygen lack, or anoxia. Hawkins and McLaughlin[4] noted that the basic oxygen requirement of the brain is 1,400 cc. of blood per minute; thus the brain, which represents one-fiftieth of the body weight, receives one-third of the left ventricular output.

There are no exact figures available for the duration of life after cessation of circulation in man. Weinberger, Gibbon and Gibbon[5] showed experimentally in cats that after stoppage of blood flow to the brain of two minutes to three minutes and ten seconds' duration all animals recovered completely in twenty-four hours. With stoppage ranging from three and one-half to five and three-quarters minutes, the cats were wildly excitable for twenty-four hours and then gradually improved to complete recovery in one week, but with alterations in behavior and loss of intelligence. With stoppage of six to seven and three quarters minutes, only 30 per cent survived. The typical picture was hyperactivity—wild, purposeless behavior, followed by stupor and no reaction to stimuli. Blindness and spasticity were present, and they were only reflex mechanisms. With cessation of circulation for more than eight minutes, no animals survived.

In man, according to Mousel, Stubbs and Kriselman,[6] complete cerebral anoxia for ten seconds produces unconsciousness; for twenty to thirty seconds, cessation of electroencephalographic waves; and for three to five minutes, irreversible pathologic changes in the cerebrum. The medulla will survive after twenty-five to thirty-five minutes of anoxia.[7] It has been shown that the brain of a young animal resists anoxia much better than that of an older one. Resuscitation in human beings has been more successful with younger patients than with those in the older age groups.

Histopathologic studies of victims of anoxia (Hawkins, McLaughlin, and Daniel;[4] Ruzicka and Nicholson[8]) have shown degeneration of cerebral and basal cell ganglions and loss of pyramidal cells of

Submitted for publication June 1, 1952.

the cortex, with chromatolysis of the few survivors. The occipital cortex showed widespread destruction causing blindness. Very little damage due to anoxia is demonstrable in other organs because, of all tissues, the brain is the most vulnerable to anoxia (Best and Taylor[7]). This explains the case in which resuscitation saves life but leaves the patient with a permanently damaged brain, a mere vegetative organism, a burden to himself, his family and society. The duration of cerebral anoxia determines the prognosis. If life is spared, various neurologic changes may occur: blindness, deafness, the Parkinsonian syndrome, athetoid and choreiform movements, speech defects and emotional and personality changes.[9]

The heart is influenced by many factors during a surgical procedure. The arrhythmias commonly observed are auricular extrasystoles and tachycardia. Manipulation of the heart may induce fibrillation.[10] Other etiologic agents that may induce fibrillation are cyclopropane, chloroform, ethyl chloride, hypoxia, emotional causes (fear) and any excessive vagal stimulation. Wiggin, Saunders and Small[11] suggested many factors as capable of inducing cardiac arrhythmias, especially the position of the patient, intratrachael and intrabronchial stimulation, manipulation of the chest wall, sudden changes in blood volume, etc. Stephenson[12] has been impressed by the high incidence of vagovagal reflex in his series (approximately 30 per cent).

Preoperative medication is important in the protection of the brain from anoxia. Analgesic drugs depress cellular activity and therefore oxygen requirements. The drugs that stimulate the brain, such as caffeine, coramine and metrazol, increase its oxygen demands. Their use is to be condemned in cases of cardiac arrest.[5]

The heart may also be protected by preoperative medication. Atropine and scopolamine, by their action of blocking vagal effects on the sino-auricular node, guard against sudden shock. Procaine hydrochloride reduces the irritability of the conduction system of the heart and has a protective action against ventricular fibrillation. There is no proof that it changes fibrillation to a normal rhythm, although instances of success have been reported. It is recommended for intracardiac and intravenous administration in cases of cardiac arrest, especially with fibrillation.[12]

Epinephrine stimulates by direct action on the myocardium. It is useful in stimulating a heart whose contractions are weak.

Experimental work has shown that it is possible to apply electric current to the heart for the purpose of stopping ventricular fibrillation. Wiggers[13] used a momentary shock, 1 ampere of 110 volt, 60 cycle alternating current, with electrodes on opposite sides of the heart. He noted that three to seven shocks stopped fibrillation, causing cardiac standstill, which could be changed to rhythmic contractions by massage. Beck[14] and Lampson[15] reported good clinical results from this procedure.

Diagnosis.—The chief cause of failure in the treatment of cardiac arrest is delay in diagnosis. The anesthetist is the team member who observes the calamity first, and it is his duty to notify the surgeon at once of his suspicions. He observes respiratory arrest easily. Absence of palpable pulse and blood pressure require prompt action on the part of the surgeon. The thoracic surgeon has the advantage of immediate visualization of the heart. The general surgeon must palpate a major artery at once, aorta, carotid or femoral, depending on the type of operation that is being performed. Dripps[5] emphasized the waste of time that dooms the patient when a stethoscope is searched for and colleagues unfamiliar with the problem are called in consultation. The electrocardiogram is not to be relied upon, as the heart current is present for several minutes. Dripps stated: "Opening the thorax is the only conclusive procedure. If the heart has stopped, or the ventricles are fibrillating, minutes can be saved by adopting the attitude of rapidly opening the chest for diagnosis. Whereas if the

heart is beating feebly, little harm may have been done."

Treatment.—The essentials of therapy are (a) artificial ventilation of the lungs with 100 per cent oxygen and (b) cardiac massage.

When this emergency occurs in the operating room the artificial respiration may best be given by manual compression of the breathing bag of the anesthesia machine. The oxygen is pushed into the lungs, and the elastic recoil of the respiratory organs completes the cycle. The force applied to the bag should not exceed 20 mm. of mercury, or damage to the pulmonary alveoli may produce edema, etc. If a machine is not available, the bag technic may be used, or recourse may even be had to exhaled air from the operating surgeon. The air passages must be checked for any obstruction and an airway inserted to keep them open. Manual artificial respiration may be necessary for five to thirty minutes after the heart rhythm is reestablished.

Coincidentally with this action on the part of the anesthetist, the surgeon must start artificial circulation by cardiac massage. If the thorax is open, direct massage of the heart must be started by grasping the heart in the hand and compressing it firmly thirty to forty times per minute. With effective massage, the radial pulse can be palpated and a definite blood pressure can be measured. Harken (cited by Wiggins[11]) suggested the clamping of the aorta distal to the carotid arteries to direct blood flow to the vital brain centers. A successful resuscitation including this measure has been reported by Carter.[16]

If the thorax is not open, the surgeon must make a choice of methods of cardiac massage. The direct approach through the fourth left interspace is the procedure approved by most authors. A transverse incision is made, with division of the fourth and fifth costal cartilages to allow the surgeon's hand to reach the heart.

If the abdomen is open, massage through the diaphragm may be done. In this maneuver the surgeon's hand compresses the heart against the anterior chest wall. It is not as satisfactory as direct compression in the hand but has been successful many times. A modification suggested is incision of the anterior leaf of the diaphragm so that the heart can be grasped by the surgeon's hand. In any abdominal approach the disadvantage of nonvisualization of the heart is present. Many times the question of fibrillation cannot be answered, and it is impossible to apply electrodes to defibrillate the myocardium.

The surgeon must act promptly. Sterile drapes, skin preparation, etc., are niceties of surgical technic, but in this emergency a rapid knife stroke is important. No bleeding is encountered until the heart has been revived, and by that time hemostats, etc., can be obtained. The vital factor is to begin massage as soon as possible, and this will force oxygenated blood to the vital brain centers. Every operating room should contain a sterile "cardiac resuscitation kit" containing a scalpel, hemostats and retractors, and this should be instantly available.[12a]

Massage produces palpable pulse and blood pressure. Touroff and Adelman[17] reported a case of complete recovery of a 16-year-old boy in whom massage was continued for forty minutes.

The injection of drugs into the cardiac chambers has always hitherto been recommended, but it is now the consensus that the heart was stimulated by the needle prick more than by the drug. It is generally accepted that a syringe containing 9.5 cc. of 1 per cent procaine hydrochloride and 0.5 cc. of 1:000 epinephrine should be included in the resuscitation kit. This is injected into the auricle to prevent fibrillation, but the injection is done after massage is started and not before.

Prognosis.—Once cardiac function is reestablished, one may expect the return of respiration within five to thirty minutes. During this period artificial respiration must be maintained. Ruzick and Nicholson[8] warned that eventual recovery of patients is not assured by the revival of cardiac and respiratory activity. Death

frequently occurs one to fifteen days later. The patients show evidence of damage to the brain by the severe hypoxia, even to the point of decerebration. These patients require the best of nursing care. Antibiotics must be used and the fluid and electrolyte balance carefully checked.

Many factors determine the outcome; the age of the patient, his cardiac status prior to the operation and the cause of the cardiac arrest. Young, healthy hearts can be restored with relative ease, but a mycardium damaged by toxemia, arteriosclerosis, coronary insufficiency, hypertension or narcosis is much less likely to recover. The length of the period of anoxia is the greatest single factor. Delay in diagnosis, delay in institution of 100 per cent oxygen inhalations, delay in starting cardiac massage—these are most vital factors. If the duration of cerebral anoxia does not exceed two to four minutes, complete recovery may be expected. With slightly longer periods of arrest, convalescence is usually very stormy, but the patient will show progressive improvement with each passing hour. There will be an acute febrile response (temperature elevation to 106 F.), much muscular rigidity, twitchings, convulsions and varying degrees of coma. Prognostically, coma lasting more than twelve hours is unfavorable. In such a case consciousness is not likely to return, and the heart beat may cease again in a few hours or days. If recovery ensues, the cerebral cortex is usually damaged to such an extent that the patient is a decerebrate vegetable.

REPORT OF CASES

E. G. H., a white man 45 years old, entered St. Francis Hospital on Nov. 8, 1948, for the repair of a left inguinal hernia. He stated that his health had always been good. Examination revealed no abnormality except the hernia. The blood pressure in millimeters of mercury was 140 systolic and 90 diastolic. Preoperative medication was given (seconal gr. 1½, dilaudid gr. 1/32). Preoperatively the patient was noted to be sweating profusely but stated that he "felt fine." Spinal anesthesia was induced with pontocaine; the patient was then given 5 per cent pentobarbitol and went to sleep. The operation was started but had progressed only to the opening of the external oblique aponeurosis when the anesthetist noted cessation of respiration and weakness of pulse. Artificial respiration was started with 100 per cent oxygen. Metrazol was given through intravenous tubing. No blood pressure could be detected. The heart sounds could be auscultated but were weak and then ceased. One cc. of 1:1,000 epinephrine was injected intracardially through the fourth left interspace. There was no response. Many precious minutes were spent in these procedures. The abdomen was then opened, and subdiaphragmatic cardiac massage was done. The heart started within forty-five seconds and was soon contracting regularly and strongly. The pulse rate was 80 and the blood pressure 112 systolic and 60 diastolic. The wound was closed. Artificial respiration was continued for twenty minutes, after which normal respirations returned. The patient was kept on the operating table for an hour, receiving pure oxygen. He was also given intravenous coramine, caffeine sodium benzoate and metrazol.

He was returned to his room, where oxygen was continued by nasal catheter. There was much moisture in the lungs; pulmonary edema was present, which may have been induced by the artificial respiration. There was no flicker of consciousness. It was necessary to aspirate mucus from the throat every few minutes. Morphine was given to relieve this condition.

Six hours later there was no sign of returning consciousness and the pulmonary edema persisted. The pulse rate was 88, the blood pressure 114 systolic and 84 diastolic. The patient was given hypertonic plasma without noticeable change. During the next twelve hours the pulmonary edema lessened; otherwise his condition was stationary. The rectal temperature rose to 103.8 F. There was gradual failure during the next few hours. The lungs remained clear, but the pulse became more rapid and the blood pressure dropped. There were no signs of cerebral activity at any time. The patient died twenty-seven hours after cardiac resuscitation.

Further questioning of this patient's wife after the cardiac arrest revealed that he had been hunting the previous fall and had complained of dyspnea and pain in the chest. He refused to consult a doctor on his return, saying that he did not wish to curtail his activities.

Autopsy showed a small coronary tree with patchy and moderately severe arteriosclerosis. The brain revealed patchy zones of pallor. Grossly and microscopically these areas revealed neuron destruction and degeneration.

Case 2—Mrs. F. E., a white woman aged 55, was seen at Glockner Hospital in consultation with J. R. Bradley, M.D., on Jan. 22, 1949. She had had a severe infection of the upper part of the respiratory system for two weeks. She had been treated with penicillin and had improved. In the week prior to consultation severe laryngitis had developed, with swelling of the tissues of the neck about the larynx. The treatment had consisted of steam inhalations and administration of pyribenzamine and penicillin, but no relief had resulted. The patient's breathing was difficult. She was forced to sit up in spite of the use of an oxygen tent. She had had very little food for three days and very little sleep. The past history revealed arthritis and hypertension with blood pressure ranging from 180 to 200 systolic and 100 to 120 diastolic.

On January 22 the patient's color was dusky, and the diagnosis of possible prelaryngeal abscess was made. Tracheotomy was advised. She was taken to the operating room and placed in a sitting position. The skin was prepared with tincture of merthiolate and local infiltration anesthesia induced with 1 per cent procaine hydrochloride. At this time the patient struggled and the respirations ceased. A transverse incision was done for tracheotomy, and this opened into an abscess cavity containing about 2 ounces of greenish pus. The trachea was quickly identified and the tube inserted. The surgeon's gloves were changed and a fresh scalpel obtained. A transverse subcostal incision was made and cardiac massage started subdiaphragmatically. The heartbeat started promptly. In this case the time consumed between stoppage of the heart and resuscitation was not more than three and one-half minutes. Artificial respiration with 100 per cent oxygen was immediately started through the tracheotomy tube, and within fifteen minutes normal respiratory rhythm returned.

The patient was unconscious but was returned to her room. About seven hours later there developed convulsive twitchings of the arms and legs, of the purposeless type. Coma remained complete. Constant aspiration of mucus from the tracheotomy tube was required. The patient received 100 per cent oxygen through the tracheotomy tube and was given a transfusion of 500 cc. of blood.

Twenty-four hours after resuscitation she showed no signs of consciousness but did have many purposeless twitchings and clonic contractures of the extremities. She was given antibiotics and fluids as needed. The heart rate varied from 80 to 96, and the blood pressure fluctuated from 130 to 180 systolic and 90 to 110 diastolic.

During the next week symptomatic treatment was carried out. Fluids were given by vein, and antibiotics were continued daily. Nursing care was excellent. The unconsciousness continued, with some purposeless movements. The temperature by rectum was elevated as high as 106 F.

The next three weeks remain a nightmare in my memory. There was no change in consciousness, and it was apparent that we had a decerebrate patient. On February 9, after consultation with confreres, the family was advised of the hopelessness of the situation. It was decided to discontinue antibotic therapy but continue feedings by nasal tube. Very little change was noted for some time. The patient remained comatose. She lived until February 18, twenty-seven days after cardiac resuscitation.

At autopsy, the lungs showed bronchopneumonia with multiple abscess formation. The brain showed nothing grossly, but microscopically the neurones of the cerebral cortex were greatly decreased in number. Throughout the cortex there were numerous areas completely devoid of neurones, and in these regions proliferating capillaries and gliosis were apparent.

COMMENT

These 2 personal cases are reported to exemplify the pitfalls of the treatment. The patient in Case 1, as has been stated, appeared nervous and was sweating profusely when seen before the operation, but stated that he "felt fine." At this time he was probably pouring out additional quantities of epinephrine which affected the heart adversely, leading to myocardial irritability. In this case, intracardiac injection of epinephrine was attempted, as well as intravenous use of metrazol prior to cardiac massage. I am now convinced that too much time elapsed before cardiac massage was instituted and cerebral

anoxia was prolonged unduly. The pulmonary edema probably resulted from the forceful artificial respiration. The basic pathologic condition in this case was the arteriosclerotic narrowing of the coronary vessels, which produced myocardial hypoxia and liability to cardiac arrest. This heart was not suitable for resuscitation.

Case 2 presents the problem of prolonged hypoxia over a period of several days. The pretracheal abscess had been slowly forming, producing pressure and respiratory obstruction. The brain had been suffering from oxygen want for a long period of time, in spite of the use of an oxygen tent. In this instance cardiac massage was instituted within three and one-half minutes of the time of arrest and a prompt resuscitation occurred, but the brain was so damaged by the continued hypoxia that complete recovery could not occur. This case presents also the economic problems facing the families of such patients. The woman survived for twenty-seven days, the longest period noted in the available literature. Hawkins[4] reported survival for twenty-six days, with death occurring at the end of that time. The patient had a private room with three special nurses during all that time, which could ill be afforded.

The heart can be restarted with relative ease even many minutes after cessation (Kountz[18]). The problem is the brain damage that occurs. Recent newspapers mentioned a case in which a man was brought to a veterans' hospital and cardiac massage started his heart fifteen minutes later. The latest report in the press was that he would require domiciliary care. Is it worth while? I think every surgeon must answer that question in his own mind when faced with the problem. If the patient is young and vigorous and the action prompt and daring, the results will be excellent. For older patients with sclerosis of the coronary vessels, etc., the wisdom of the procedure is questionable.

Stephenson's recent summary[2] brought to light many challenging facts. Time is the most vital factor. In his study of 1,125 cases, 91 per cent of those in which "permanent" survival was obtained, massage of the heart was begun within four minutes. In only 9 per cent was the treatment successful after a delay of more than four minutes.

Stephenson further observed that in the first 1,000 cases studied a "permanent" survival was obtained in 28 per cent. Of the same 1,000 cases, the heart could be restarted in 48 per cent but delay had been too long for the patient to return to life. Many of these cases date back many years, and it is to be hoped that with present knowledge a much higher percentage of recoveries will occur. In Stephenson's opinion, almost every heart can be restarted if proper measures are instituted promptly, and this fact is borne out by evidence from the laboratory.

In his series of cases, 13 per cent of the cardiac accidents occurred outside the operating room. Some patients were in the roentgen department, the receiving room, a dressing room, a ward, an elevator, one of the halls, etc. The problem must be faced everywhere. The type of operation is not a factor; many cardiac arrests have occurred during minor procedures. Any age group may be affected, 20 per cent of such accidents occurring in the first decade of life.

In Bellevue Medical Center there has now been set up a mobile cardiac resuscitation unit, in order to be always prepared. It contains the necessary surgical instruments (sterilized) for thoracotomy; syringes filled and ready for use; a positive and negative pulmonary resuscitator; an electric defibrillator; an electrocardiographic machine, an electrophrenic stimulator, interval timers, oxygen tanks, etc. The interval timer plays an important role. It is started at once and rings at one-minute intervals. It seems evident that unless the heart is restarted by the end of the third minute, all efforts should cease, as the chances of permanent survival are remote and the possibility of permanent damage to the brain is too great.

SUMMARY

Cardiac arrest is an uncommon complication demanding prompt recognition and immediate therapy. Success depends on the length of time the brain is deprived of its oxygen supply. Any delay of more than three to four minutes results in permanent cortical cerebral damage.

The basic principles of treatment are artificial respiration with 100 per cent oxygen and cardiac massage. A planned procedure, sterilized instruments and teamwork will permit the heart to be restarted within the four-minute limit.

The best results are obtained in young, previously healthy patients. The results in older, debilitated persons are not as satisfactory.

Every surgeon must have a carefully worked out plan to meet this complication.

SUMARIO

A sincope cardiaca é complicação rara que requer reconhecimento pronto e terapeutica imediata. O sucesso depende do tempo que o cerebro é privado de oxigenio. Qualquer demora superior a tres ou quatro minutos resulta em dans cortical permanente.

Os principios basicos de tratamento são a respiração artificial com cem por cento de oxigenio e massagem cardiaca. Uma ação planejada, instrumentos esterilizados e trabalho de equipe permitirão ao coração bater de novo dentro do limite de 3 minutos.

Os melhores resultados são obtidos em jovens previamente sadios. Os resultados em pessôas velhas e debilitadas não são tão satisfatorios. Todo cirurgião deve ter um plano adrede preparado para fazer face a esta complicação.

RÉSUMÉ

L'arrêt du coeur est une complication rare. Elle demande un diagnostic précoce et un traitement immédiat. Le succès du traitement est en relation directe de l'ischémie cérébrale du eau manque d'oxygène. Une privation de plus de 3 à 4 minutes amène une destruction corticale permanente. Le principal traitement consiste en une oxygénation à 100% en même temps qu'un massage du coeur. Avec unplan bien établi, des instruments stérilisés, un travail d'équipe, on peut rétablir les pulsations cardiaques en dedans de 4 minutes. L'âge du sujet, ses conditions physiques antérieures aident au succès du traitement. Chez la personne âgée, les succès sont plus incertains. Tout chirurgien doit être préparé à remonter cette complication.

RIASSUNTO

L'arresto cardiaco è una rara complicazione che richiede diagnosis pronta e terapia immediata. Il successo dipende dal periodo di tempo durante cui il cervello è rimasto privo di apporto di ossigeno. Un ritardo superiore a 3-4 minuti è causa di un danno corticale irreparabile.

I principi fondamentali della cura consistono nella respirazione artificiale con ossigeno al 100% e nel massaggio cardiaco. Un piano di cura ben studiato, uno strumentario sterilizzato già pronto e una équipe sperimentata potrà permettere di riuscire a ristabilire il battito cardiaco entro il limite dei 4 minuti.

Migliori risultati si ottengono nei giovani che, prima dell'intervento, erano in buone condizioni generali. Meno soddisfacenti sono i risultati nei malati vecchi e debilitati.

Ogni chirurgo deve essere preparato ad affrontare nel migliore dei modi tale complicazione.

RESUMEN

El pao cardíaco es una complicación nada común que necesita reconocerse con prontitud y tratarse inmediatamente. El éxito depende del período de tiempo durante el cual el cerebro sea privado de oxígeno. Cualquier demora mayor de tres a cuatro minutos da por resultado lesión cerebral cortical permanente.

Los principios básicos del tratamiento

son la respiración artificial con ciento por ciento de oxígeno y masaje cardíaco. Un procedimiento metódico, instrumentos esterilizados y personal competente permitirán la reanudación del trabajo cardíaco dentro del límite de cuatro minutos.

Los mejores resultados se obtienen en pacientes jóvenes y con buena salud anterior, no siendo satisfactorios en personas de mayor edad y debilitadas. Todo cirujano debe estar bien preparado para enfrentarse a esta complicación.

ZUSAMMENFASSUNG

Herstillstand ist eine ungewoehnliche Komplikation, die sofort erkannt und unverzueglich behandelt werden muss. Der Erfolg der Therapie haengt davon ab, wie lange die Sauerstoffversorgung des Gehirns unterbrochen ist. Verzoegerungen von mehr als drei bis vier Minuten haben eine endgueltige Schaedigung der Gehirnrinde zur Folge.

Die fundamentalen Grundsaetze der Behandlung liegen in kuenstlicher Atmung mit hundertprozentigem Sauerstoff und in Massage des Herzens.

Planmaessiges Vorgehen, Verfuegbarkeit steriler Instrumente und eingespielte Zusammenarbeit einer Arbeitsgruppe gewaehren die Moeglichkeit, das Herz innerhalf der Vierminutenfrist zur Wiederaufnahme seiner Aktion zu bringen.

Die besten Erfolge werden bei jungen und vorher gesunden Patienten erzielt. Bei aelteren und geschwaechten Personen sin die Resultate nicht so zufriedenstellend.

Jeder Chirurg muss ueber einen sorgfaeltig ausgearbeiteten Plan zur Bekaempfung dieser Komplikation verfuegen.

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Accessory Bones and Anomalies Often Mistaken for Fractures

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THE various accessory bones and osseous anomalies are often confused with the effects of trauma. This is not a new fact, nor is the description or demonstration of these minor bone abnormalities new knowledge. They have been well described elsewhere. The purpose of this paper is to remind surgeons of these so that the mistake of calling them fractures may be avoided. If doubt exists as to whether there is a fracture or whether it is a supernumerary bone or a sesamoid bone, a roentgenogram of the opposite side should be made, because such variations are often symmetric.

The Hand and Wrist.—Small round or oval bones accessory to the phalanges of the hand are often seen. These are sesamoids. One is present on the flexor side of the thumb, between the first and second phalanges. Rarely is one present in the index finger. Anatomists have established no less than nine sesamoid bones at the heads of the metacarpals.

The number and distribution of sesamoids can be different in the two hands of the same person. Occasionally the sesamoid bone may be double. Variations in the ossification of the bones of the hand concerns mostly the development of the so-called pseudoephyses and the true supernumerary epiphyses, and are present in the metacarpals. The so-called dense unfused epiphyses of phalanges may be confused with the effects of trauma. These later, when fused, have normal osseous density and are due to an unusual form of dystrophy. They are multiple and can be recognized by taking roentgenograms of both hands. Fusion of the epiphysial plate results in a denser transverse line called the epiphysial scar and should not be mistaken for an impacted fracture line.

There are multiple varieties of supernumerary carpal bones. The most common variety is the os trapezoideum secondarium, the next most common being the os centrale, which is situated between the scaphoid and the os magnum. The others are very rare.

Bipartite scaphoids are not rare and are usually bilateral. If roentgenograms are made some time after the truma, it may be difficult to differentiate between congenital bipartite scaphoid and ununited fracture. The latter is usually associated with signs of traumatic arthritis.

The Elbow.—Congenital deformities of the elbow are less frequent than those of the wrist and hand, and are frequently bilateral and familial. They include fusion of the epiphyses resulting in bony ankylosis, subluxations and, rarely, patella cubiti.

Patella cubiti, described by Gunn, may be present as a unilateral or bilateral large sesamoid dorsal to the elbow. It has the appearance of a patella and is extracapsular.

The Shoulder.—Some of the multiple ossifications of the scapula may remain unfused in adult life and erroneously be called fractures. These include unfused nuclei for the acromion (os acromiale), the coracoid process, the upper surface of the glenoid and the inferior angle of the scapula. These occur as bilateral defects.

Undescended scapula, congenital high shoulder, or Sprengel's deformity is a congenital anomaly in which there is elevation of the affected scapula, the superior border of which is on a higher plane than

Read at the Sixteenth Annual Congress of the United States and Canadian Sections, International Colloge of Surgeons, Chicago, Sept. 13, 1951.
Submitted for publication Oct. 5, 1951.

the neck of the first rib. There may be associated anomalies of the ribs and of the dorsal portion of the spine.

The Foot.—Little sesamoid bones occur on the plantar surface of the metatarsal heads. Most common are the two sesamoids under the head of the first metatarsal; frequently there is one at the fifth metatarsal head and one at the second metatarsal head. Other sesamoids are less frequent. It is important to remember that sesamoids may be double and multiple, and may not be symmetric in the two feet. Fractures may occur in the sesamoid, but when present they show irregular sharply demarcated margins in contradistinction to the smooth oval or rounded margins of the double sesamoid.

At the head of the first metatarsal a pseudo-epiphysis may occur, of the same type as that which forms in the head of the first metacarpal.

Accessory bones of the foot are important to recognize, because they are not infrequently mistaken for fractures. They are generally bilateral. The epiphysis for the base of the fifth metatarsal is often mistaken for fracture because of its irregular surface against its diaphysis. Multiple nuclei for this epiphysis gives the appearance of fragmentation. A separate and rare bony ossicle, not to be confused with the epiphysis, occurs near the proximal end of the fifth metatarsal and is called os vesalianum. Correlation of clinical history, physical observations and roentgen examination is essential to rule out the possibility of fracture.

Os tibiale externum, the accessory scaphoid, is important to recognize and occurs as a single or double piece of bone at the inner border or tuberosity of the scaphoid. It should not be diagnosed as a fracture. According to Pfitzner, it is present in about 10 per cent of persons and usually is bilateral.

In the lateral view of the foot there is a posterior tuberosity to the astragalus, which in about 8 per cent of cases is unfused and remains as a separate bony ossicle, which may be circular, oval or triangular. This is known as the os trigonum. Although it may be separated by trauma, it is not the result of trauma. It is nearly always present in both feet.

Other accessory bones of the foot of lesser importance include secondary os calcis, secondary cuboid, intercuneiform, intermetatarsum, uncinatum, peroneal sesamoid, paracuneiform, astragaloscaphoid ossicle and os subtibiale.

The Knee.—The most common congenital abnormality of the knee is a bipartite or tripartite patella, which on the anterior-posterior roentgenogram may be confused with fracture. A fragment or fragments are separated at the superolateral margin of the main body of the patella. On a lateral view a typical smooth-margined cleft is detected at the middle of the bone. On tangential projection the smooth margins of the detached lateral fragment are confirmatory of its anomalous nature.

A separate bony ossicle for the tubercle of the tibia may persist and sometimes may show fragmentation. Correlation with the history and the results of physical examination is essential in distinguishing this from fracture.

Often present is a sesamoid, the fabella, in the outer head of the gastrocnemius, seen in the anteroposterior view at the lateral condyle of the femur and in the lateral view over the popliteal space. It occurs in about 25 per cent of adults. It should not be confused with fracture, foreign body or loose body.

The Hip.—Congenital abnormalities of the upper end of the femur, such as delay in ossification or congenital dislocation, are not usually confused with fractures. However, os acetabuli, a bony ossicle seen at the highest and most lateral border of the superior margin of the acetabulum, is frequently referred to as a fracture. This anomalous bone may appear as a thin strip of bone, as an oval ossicle or as a triangular ossicle with rounded borders. It may or may not be partially united with the ilium. Though frequently bilateral, it may occur unilaterally. In questionable cases, both hips should be studied roentgenographically. Subsequent films will show no evidence of bone absorption or

callus in the presence of os acetabuli; this is in contrast to the follow-up roentgen appearance of a fracture fragment.

The Spine.—Certain of the epiphyses or secondary centers of ossification of the vertebrae may fail to unite with the parent bone. These persistent epiphyses give the roentgen appearance of a detached bony fragment, from the superior or inferior margin of the vertebral body anteriorly, the tip of the transverse process, the spinous process or the articular process, and may be erroneously considered fractures. On a lateral roentgenogram these appear as small triangular bony bodies on the upper and lower anterior margins of the vertebral bodies. Though persistent epiphyses are often multiple, a single one may occur.

Congenital deformities of the spine are very common. Some are very severe and incompatible with life; others are insignificant and discovered only by roentgen examination. The congenital deformities occur most frequently in the lumbosacral region. Some of the more common abnormalities that may be confused with the effects of trauma are spina bifida occulta, sacralization of the transverse process, hemivertebra, cleft bone defect in pars interarticularis or pedicle, and spondylolisthesis.

Spina bifida occulta is the commonest type of spinal deformity. This is the result of failure of closure of the neural arch of one or several vertebrae. It usually occurs in the lumbosacral area and is readily recognized on the roentgenogram. The margins of the defect are smooth and rounded. There may be no physical signs or symptoms, but in some cases over the bone defect there may be a dimple in the skin, a tuft of hair or a small lipoma, or such symptoms as low back pain, disturbance of micturition or disturbances in the lower extremities.

In sacralization of the transverse process of the fifth lumbar vertebra the transverse process is enlarged, elongated and shaped like a butterfly wing, abutting against the ala of the first sacral segment. It is often associated with bursa formation. It is sometimes present bilaterally. Although frequently present without symptoms, it may be associated with such symptoms as low back pain, pain of the sciatica type with atrophy of gluteal and thigh muscles, and scoliosis.

Hemivertebra, or half vertebra resulting from abnormal ossification, causes scoliosis and arthritic changes that may be mistaken for changes due to injury. This abnormality, though not common, should be remembered and excluded before one states that the spinal deformity is the result of old compression fracture. When the abnormality occurs in the dorsal region, an extra rib is found on the ipsilateral side, and when it occurs in the lumbar portion of the spine an extra transverse process may be counted.

Incomplete bony development of the pedicle at the pars interarticularis occurs unilaterally and bilaterally, usually in the fifth lumbar vertebra, occasionally in the fourth, and rarely in the third. On the oblique roentgenogram the abnormality is seen as a narrow, smooth defect in the bone which may be confused with fracture. The smooth and dense margins of the defect indicate its true nature. It may or may not be associated with low back pain. It may or may not be associated with forward displacement of that portion of the vertebra which is anterior to the defect.

Spondylolisthesis, according to Brailsford, is an anterior dislocation of the fifth lumbar vertebral body and the anterior portion of its neural arch, due either to stretching of the interarticular portion or pedicle of the vertebra or to a developmental defect in the pars interarticularis and rupture of some attachments of the lumbosacral intervertebral disc. The abnormality is a definite entity progressively developing over a period of time and should not be confused with dislocations due to known causes, such as acute fracture-dislocations, infections or tumors. On the anterior roentgenogram the shadow of the fifth lumbar vertebra is superimposed over the shadow of the first sacral segment. On the lateral view there is

characteristic evidence of anterior dislocation of the body of the fifth lumbar vertebra on the first sacral vertebra. Often bone defects in the neural arch may be seen in the lateral as well as in the oblique view. Complete roentgenograms of the best quality are essential in determining the presence and extent of this abnormality.

SUMMARY

Examples of variations in ossification and development of bone which are often confused with effects of trauma are reviewed. The hand and wrist, the elbow, the shoulder, the foot, the knee, the hip and the spine are included in the bones that may be affected.

RÉSUMÉ

L'Auteur repasse les causes d'erreurs fréquentes entre les modifications physiologiques d'ossification et les traumatismes. Les régions les plus affectées sont la main, le poignet, le coude, l'épaule, le pied, le genou, la hanche et la colonne.

RESUMEN

Se hace una revisión sobre las variaciones de la osificación y desarrollo óseo, confundidos a menudo con efectos traumáticos. Se incluyen entre los huesos afectados mano y muñeca, codo, hombro, pie, rodilla, cadera y columna vertebral.

SUMARIO

Exemplos de variaçõesna desenvolvimento dos ossos, os quais são muitas vezes confundidos com efeitos de trauma são revistos. A mão e punho, o cotovelo, o ombro, o pé, o joelho, a bacia e a espinha são incluidos entre os ossos que podem ser afetados.

RIASSUNTO

Vengono passate in rassegna alcune anomalie di ossificazione e di sviluppo delle ossa, che vengono spesso interpretate come alterazioni traumatiche. Fra le ossa che possono andar soggette a tali stati patologici vengono elencate quelle della mano, del polso, del gomito, della spalla, del piede, delginocchio, dell'anca e del rachide.

ZUSAMMENFASSUNG

Es werden Beispiele von Abweichungen der Ossifikation und der Entwicklung des Knochens besprochen, die haeufig mit Verletzungsfolgen verwechselt werden. Zu den Knochen, die in Frage kommen, gehoeren das Skelett der Hand, des Handgelenks, des Ellbogens, der Schulter, des Fusses, des Knies, der Huefte und der Wirbelsaeule.

For information pertaining to qualifications for

Fellowship or Associate Membership

in the

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Treatment of Subdeltoid Bursitis with Roentgen Therapy

LAWRENCE S. MANN, M.S., M.D., F.A.C.S., F.I.C.S.
CHICAGO

MANY different terms have been used in the literature to describe the entity known as subdeltoid bursitis. Among these synonyms are calcification of the subacromial bursa, Duplay's disease, humeroscapular periarthritis, paraarthritis, para-articular calcification, periarticular calcification, peritendinitis calcarea, subacromial calcification and subdeltoid calcification. Robinson's classification[1] of acute or chronic bursitis (excluding rupture of the supraspinatus tendon and acute traumatic bursitis) is probably one of the best. In cases of acute bursitis, the history is that of a sudden pain in or about the shoulder girdle, which may radiate to the arm or neck. Tenderness on pressure over the greater tuberosity is usually present. There is difficulty in rotation or abduction of the arm because of painful friction due to the anatomic relation of the subdeltoid bursa and the supraspinatus tendon. Signs of inflammation may be present. In cases of chronic bursitis the pain is less severe. There may be a slight degree of discomfort in the region of the biceps muscle. Some difficulty is noticed when the arm is raised parallel to the floor.

Etiologic Factors.—There is no general agreement as to the cause of this condition, although various theories have been advanced. Codman's opinion[2] is that small bloody deposits are produced, owing to trauma and strain, which subsequently become calcified. Some authors find no evidence of trauma on microscopic study of the diseased tissues.[3] Among other theoretical causes are infection, vitamin deficiencies, endocrine imbalance and metabolic disturbances. The last-mentioned seems the most plausible. No matter what the cause may be, calcium deposits are frequently observed in the necrotic tissue. The exact mechanism of this deposition has not been determined. The calcification is probably due to a change in *p*H, with increased alkalinity or decreased carbon dioxide tension.[4] The calcium deposits disappear after high voltage roentgen ray therapy (as is evidenced by roentgenograms taken before and after treatment) in this series of cases, probably because ionization takes place in the tissues with lowering of the *p*H. With the calcium removed, pain is decreased because of decrease in pressure.

Diagnosis.—The diagnosis is based on the history, the results of physical examination and the roentgen evidence. Calcium (which usually makes the diagnosis certain) may or may not be present, but when it is present it is usually lateral to the greater tuberosity. If calcium is observed on roentgen examination, uniformly good results may be anticipated from roentgen therapy. The roentgenograms routinely taken in these cases are of two types, namely, both a soft tissue film and a bone film with the palm up and with the palm down. By means of these films it is possible to demonstrate a higher percentage of calcium than with the roentgenogram of bone alone.

Other conditions about the shoulder must be considered in the differential diagnosis. Among these are arthritis of the shoulder joint (occurs only in about 5 per cent of all cases in which the shoulder is involved),[5] angina pectoris, cervical spondylitis, fracture of the humerus, herpes, neoplasm, neuralgia, rheu-

From the Department of Surgery, Chicago Medical School.
Submitted for publication March 21, 1952.

matoid arthritis, rheumatic fever, syphilis, tuberculosis, universal calcinosis and uric acid arthritis, the diagnosis of which is made by the presence of tophi and an elevated level of uric acid in the blood.

Treatment.—There is a great deal of controversy with regard to the treatment of this entity. Bosworth[6] expressed the opinion that the disease is self-limiting and curative. Iron cacodylate,[7] vitamin A,[8] ammonium chloride,[9] physiotherapy,[10] operation and excision,[11] and needling[12] have been advocated in treatment.

Conservative therapy should be utilized before any surgical procedure is employed. The most successful conservative therapy thus far has been roentgen therapy. This treatment is gauged by the amount of pain the patient is having. In the presence of acute bursitis 75 to 100 roentgens is given to the area for the first two treatments and 140 to 150 for the following treatments. Generally, two to six treatments to an area are needed. Therapy is discontinued as soon as the patient has complete relief of pain, which is usually between the third and the sixth treatment.

The physical factors utilized are 200 kilovolts, 0.25 mm. copper, and 75 to 150 roentgens per treatment. In this series treatments were given at intervals varying from every other day to five days, depending upon the amount of pain present. The average patient received about four treatments at biweekly intervals.

Exercise is encouraged with treatment, and immobilization is frowned upon. Some patients with lesions of long standing tend to protect the biceps muscles, the result of which is that contracture of the shoulder girdle occurs and the problem of a shrunken capsule has to be dealt with. The arm is never permitted to be immobile.

Results.—Fifty-two patients were treated with roentgen therapy. Two (4 per cent) showed no response; however, no calcium was demonstrated on their roentgenograms. Forty-seven (90 per cent) showed a satisfactory response. Three (6 per cent) had a recurrence six months to a year later. These patients had massive calcium deposits and responded to a second course of therapy.

The patients in this series were followed for two to four years. Calcium disappeared from the involved tissues after roentgen therapy, as evidenced by roentgenograms. Male patients were more commonly afflicted than female patients, in a ratio of about 2 to 1. Most of the patients were 35 to 45 years of age. The two subdeltoid bursae were about equally involved. In 2 cases the involvement was bilateral.

SUMMARY

A brief review of subdeltoid bursitis is presented. Fifty-two patients were studied and treated with roentgen therapy. Forty-seven, or 90 per cent, responded satisfactorily to roentgen treatment.

CONCLUSIONS

1. Roentgen therapy is a satisfactory conservative method of treating subdeltoid bursitis.
2. Immobilization should not be permitted during treatment.
3. To aid in diagnosis and demonstration of a high percentage of calcium deposits, roentgenograms of both soft tissue and bone should be taken with the hand in two positions (palm up and palm down).
4. Uniformly good results with roentgen therapy can be anticipated if calcium is demonstrated in the roentgenogram.

RIASSUNTO

Breve rassegna della borsite sottodeltoidea. I casi studiati sono 52, tutti trattati con roentgen-terapia. Di essi, 47 (90% dei casi) risposero in modo soddisfacente a tale tipo di cura.

CONCLUSIONI

1. La Roentgen-terapia è un buon metodo di cura conservativa della borsite sottodeltoidea.

2. Non è mai stata prescritta l'immobilizzazione durante la cura.
3. Per facilitare la dimostrazione ed il riconoscimento di calcificazioni, è necessario praticare esami radiologici delle parti molli e delle ossa in due posizioni: di pronazione e di supinazione.
4. Se lo studio radiologico dimostra l'esistenza di calcificazioni, si possono già anticipatamente assicurare buoni risultati dalla Roentgen-terapia.

SUMARIO

Uma breve revisão da bursite subdeltoide é apresentada. 52 casos foram estudados e os pacientes tratados com roentgenterapia. 47, ou 90 por cento, responderam satisfatoriamente ao tratamento roentgenterapico.

CONCLUSOES

1. A roentgenterapia é um metodo conservador satisfatorio para o tratamento da bursite subdeltoidiana.
2. A imobilização nunca é permitida durante o tratamento.
3. Para facilitar o diagnostico e a demonstração de uma alta percentagem de depositos de calcio, radiografias de tecidos moles e de tecidos osseos devem ser tomadas em 2 posições, palma da mão em posições prona e supina.
4. Bons e uniformes resultados podem ser assegurados si calcio tenha sido demonstrado na radiografia.

RESUMEN

Se hace una breve revisión de la bursitis subdeltoidea. Se estudian 52 casos de pacientes tratados con röntgenterapia, de los que 47 (90 por ciento) respondieron satisfactoriamente a dicha terapéutica. Se hacen conclusiones sobre lo satisfactorio de la terapéutica conservadora mencionada, la movilización durante el tratamiento, la conveniencia de los röntgenogramas para ayuda del diagnóstico y demostración de un alto porcentaje de depósitos de calcio, en cuyo caso puede anticiparse que se obtendrán uniformemente con la röntgenterapia buenos resultados.

ZUSAMMENFASSUNG

Es wird ein kurzer Ueberblick ueber subdeltoide Schleimbeutelentzuendungen gegeben. Der Verfasser untersucht 52 Faelle, die mit Roentgenbestrahlungen behandelt wurden. 47 Patienten, d.h. 90%, reagierten zufriedenstellend auf die Roentgenbehandlungen.

SCHLUSSFOLGERUNGEN

1. Die Roentgenbehandlung ist eine zufriedenstellende konservative Methode zur Behandlung der subdeltoiden Schleimbeutelentzuendung.
2. Ruhigstellung wird waehrend der Behandlung niemals gestattet.
3. Zur Erleichterung der Diagnose und zum Nachweis eines hohen Prozentsatzes von Kalkablagerungen empfiehlt es sich, sowohl Weichteil-als auch Knochenaufnahmen in zwei Stellungen, Innen—und Aussenrotation, zu machen.
4. Wenn Kalkablagerungen im Roentgenbild nachgewiesen werden, koennen von der Roentgenbehandlung einheitlich gute Erfolge erwartet werden.

RÉSUMÉ

On présente un cas de bursite sous-deltoidienne. On a étudié 52 cas où las patients furent traités par radiothérapie. 47 cas ou 90% l'ont été avec succès.

1. La radiothérapie donne d'excellents résultats dans le traitement des bursites sous-deltoidiennes.
2. Par d'immobilisation durant le traitement.
3. Pour dépister des dépôts de calcium, on fait des radiographies en deux positions.
4. Les résultats sont excellents s'il y a des dépôts de calcium.

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Fellowships Offered by Brazilian and Argentine Sections

The Brazilian Section of the International College of Surgeons is offering three Fellowships annually to Argentine medical students. The following Fellowships are available:

One Fellowship in Thoracic Surgery in Rio de Janeiro, Sao Paulo or Santos.

One Fellowship in Abdominal Surgery in Rio de Janeiro, Sao Paulo, Santos or Bahia.

One Fellowship in a surgical specialty, Anesthesiology, Radiology, or Public Sanitation in Rio de Janeiro, Sao Paulo, or Santos.

The Fellowships will consist of one or possibly two months' training between April and November, inclusive. The recipients will receive complete maintenance and the sum of two thousand Cruzeiros.

The officers of the Brazilian Chapter will advise the Argentine Section annually of the hospitals which will offer Fellowships.

The Argentine Section will offer three scholarships to Brazilian medical students.

The following Fellowships now being offered by the Brazilian Section:

Orthopedics and Traumatology

Hospital das Clinicas—Prof. Dr. Godoy Moreira, Sao Paulo.

Anesthesiology

Hospital Central da Santa Casa de Misericordia de Sao Paulo. Prof. Dr. Roberto Araujo.

Abdominal Surgery

Sanatório Sao Lucas—Prof. Dr. Eurico Branco Ribeiro, Sao Paulo.

Editorials

Living to Learn

The Seventeenth Annual Congress of the United States and Canadian Sections of the International College of Surgeons was preceded by a highly successful two weeks of postgraduate study in the special course presented jointly by the International College and the Cook County Hospital, under the supervision of staff members of the latter. Thirty-seven surgeons from twenty states and Canada attended the entire two-week session; six others were present for one week.

This course included lectures on general surgery, demonstrations of surgical technic and surgical anatomy, and operative clinics at Cook County Hospital. Sessions in surgical pathology and physiology, as well as supervised practice surgery on anesthetized animals, were made available to those who attended. Great emphasis was placed on preoperative and postoperative care of the surgical patient, and the lectures covered a surprising number of fields of surgical practice—surgery of the intestines, the stomach, the thyroid, the gallbladder and biliary tract, the esophagus, the pancreas and spleen, and the genitourinary tract. Traumatic surgery was not neglected, nor was the surgical repair of hernia or the surgical treatment of

Preassembly Postgraduate Class, Chicago, 1952.

burns. An earnest and purposeful atmosphere pervaded the sessions, and those in attendance will undoubtedly approach the activities of the forthcoming Congress with increased awareness of the problems to be discussed. On Friday, July 25, a reception was held at the Home of the College in honor of the surgeons attending, their wives, and those who so generously contributed to the program.

We feel that the occasion more than fulfilled the hopes that led to its conception and justified a hundredfold the planning and care that went into its realization. The International College of Surgeons, ever mindful of the profound seriousness of the surgeon's work and the immense importance to humanity of his accomplishments, is desirous of losing no slightest opportunity to reassert these points. In a field so extensive, so complicated and so rapidly progressive as modern surgery, no worker can afford to stop learning; it is a lifetime process. It is satisfying to reflect, in the light of our successful pre-Congress course, that most surgeons not only realize these facts but act upon them.

M. T.

A Long Step Forward

The Journal has the great honor and pleasure of announcing that on September 3, 1952, at the Seventeenth Annual Congress of the United States and Canadian Sections of the International College of Surgeons, held recently in Chicago, a signal advance in cardiac surgery was recorded in the annals of surgical history. Dr. Charles P. Bailey, F.A.C.S., F.I.C.S., reported the use of hypothermia in the first open intracardiac surgical procedure ever to be performed on a patient under this type of anesthesia.

In making his report, Dr. Bailey exhibited a motion picture illustrating his technic as employed in experimental animals to a level of 75 to 80 degrees Fahrenheit, it is possible to obstruct completely the entrance of blood into the right atrium (by occlusion of the venae cavae) for periods of fifteen to twenty minutes without visceral damage and without damage to the central nervous system. The cardiac chambers are then widely opened for the performance of any chosen intracardiac operation under direct vision. By the use of this method, septal defects have been created in dogs and have subsequently been closed, with direct vision available throughout.

The logical next step was application of this principle to man. On August 29, 1952, at the Hahnemann Hospital in Philadelphia, a 30-year-old housewife with a very large interatrial defect was placed in a modified commercial deep-freeze unit until the body temperature dropped to 78 F. The venae cavae were clamped off for seven minutes, and the defect was closed by suturing.

Unfortunately, the patient did not recover from the operation, but a patient subsequently operated on, also in Philadelphia, survived *with complete correction of her atrial septal defect.*

Dr. Bailey expressed the opinion that the complicated "heart-lung machine" will probably always be impractical except for an occasional major intracardiac procedure and that direct open operation with the patient under hypothermia represents the intracardiac surgery of the future. It is entirely possible that he is right. Certainly, since the very origin of the concept of refrigeration as a form of anesthesia, interest in the subject has been intense and many possible applications of the technic have been and are being studied.

At all events, Dr. Bailey's report is in

the grand tradition of the profession, based as it is on long and careful study and experiment. A full account of the meticulous experimental work that led up to this achievement will appear under Dr. Bailey's name and those of his collaborators, Drs. B. A. Cookson and W. B. Neptune, in the Post-Congress (November) issue of the Journal. Meanwhile, we congratulate Dr. Bailey upon being first in a field that may well become an extremely important one; and ourselves as well, upon being privileged to make the initial announcement in the surgical literature.

M. T.

The United States Section of the International College of Surgeons

announces the creation of Junior Membership in the College. The House of Delegates, meeting on Dec. 18, 1949, established this new form of membership, with the following requirements:

One year of internship in an approved hospital

One year as resident surgeon in a specific surgical training program

For further information, address

Secretary, Qualification Council of the United States Section of the International College of Surgeons

1516 Lake Shore Drive Chicago 10, Ill.

Section News

International College of Surgeons

United States and Canadian Sections

Karl A. Meyer, M.D., F.A.C.S., F.I.C.S., Secretary

United States-Canadian Congress an Outstanding Success: The recent Sixteenth Annual Congress of the United States and Canadian Chapters, held in Chicago at the Conrad Hilton Hotel, reached a high peak of interest and effectiveness. Not only the quality of the presentations but the fine spirit of professional fraternity and cooperation contributed to this event, which was a historic one in the annals of the International College of Surgeons. Details will appear in the forthcoming November issue of the *Journal*, and the articles presented will be published in that and succeeding issues.

Fellows of U. S. Chapter to Participate in American Fracture Association Program: At the Thirteenth Annual Meeting of the American Fracture Association, to be held at the Hotel Sherman in Chicago October 6 to 9 inclusive, many members of the United States Chapter, International College of Surgeons, will make contributions to the program. Dr. Henry W. Meyerding, President of the United States Chapter, is also President of the American Fracture Association and will preside at the General Assembly; Dr. H. W. Willmerling, also a Fellow, is its Secretary-Treasurer. Other College speakers will include Dr. Roger Anderson of Seattle; Dr. Eugene L. Jewett of Orlando, Florida; Dr. Henry A. Springer of Cincinnati; Drs. J. J. Callahan, Carlo Scuderi and James A. Valentine, Chicago; Dr. Virgil McCarty of Princeton, Indiana; Dr. William Johnson of Galesburg, Illinois; Dr. Homer D. Junkin of Paris, Illinois; Dr. James Merritt of Quincy, Illinois; Dr. Irvin H. Scott of Sullivan, Indiana; Dr. F. Wayne Brewster of Holdrage, Nebraska, and Dr. R. H. Kazmierski of Coudensport, Pennsylvania.

Registration for this meeting will be held at 4 p.m. on Sunday, October 5. The Annual Banquet will be held in the Bal Tabarin Room at 8 p.m. on Wednesday, October 8.

Dr. Thorek Honored: A group of Negro physicians and surgeons recently honored Dr. Max Thorek by the presentation of a handsome bronze placque in recognition and appreciation of his outstanding services to surgery and world democracy. The citation reads as follows:

To Doctor Max Thorek, M.D., Sc.D., F.I.C.S., F.B.C.S., D.C.M., Founder and Permanent Secretary-General, International College of Surgeons: In token of our profound admiration for his prodigious energy and talent, for his vision, his immense capacity for productive work, his leadership in surgical organization and practice, and for his inspirational life. Above all, we esteem him affectionately for his humanness and his courageous devotion to the ideals of democracy.

The presentation was made by Dr. Ulysses Grant Dailey of the Provident Hospital, Chicago. The signatories whose names appear on the placque are Dr. Dailey, Dr. James M. Allison, Dr. Helen Dickens, Dr. Charles R. Drew, Dr. John Finlay, Dr. Rivers Fredericks, Dr. Charles H. Garvin, Dr. Roscoe C. Giles, Dr. Henry L. Gowens, Dr. Henry H. Hampton, Dr. Ellsworth E. Hasbrouck, Dr. Nelson C. Jefferson, Dr. Peter Marshall Murray, Dr. M. Russell Nelson, Dr. William H. Sinkler, Dr. John J. Thomas, Dr. Matthew M. Walker, Dr. James E. Wilson, Dr. Louis T. Wright, and Dr. Asa Yancey.

Regional Meeting in Tulsa: The Tulsa regional meeting will be held on October 17 in the Topaz Room of the Tulsa Hotel, with registration on the mezzanine at 8 a.m. The Rev. Paul V. Galloway, D.D., will pronounce the invocation, after which addresses of welcome will be given by the Hon. C. M. Warren, Mayor of Tulsa; Dr. M. O. Hart, President of the Tulsa County Medical Society, and Dr. Alfred R. Sugg, President of the Oklahoma

State Medical Association. The morning and afternoon scientific sessions will be presided over by Dr. Ralph McGill and Dr. A. Ray Wiley, respectively. The following presentations have been scheduled:

Diagnosis of Tumors and Cysts of the Neck
ARNOLD S. JACKSON, B.A., B.S., M.D., M.S., F.A.C.S., F.I.C.S., Madison, Wisconsin; Director, Jackson Clinic; Chief of Staff, Methodist Hospital, Madison, Wisconsin

Closed Medullary Pinning of Colles Fractures
LESLIE V. RUSH, M.D., F.A.C.S., F.I.C.S., Meridian, Mississippi; Surgeon Matty Hersee Hospital, 1929-32; Surgery East Mississippi Insane Hospital, 1929-32; Surgeon, Rush Memorial Hospital; Member Southeastern Surgical Congress; American Medical Association

Bizarre Tumors of the Large Bowel
CURTIS ROSSER, M.D., F.A.C.S., F.I.C.S., Dallas, Texas; Professor and Head of Department of Proctology, Southwestern Medical School of the University of Texas; Chief, Department of Proctology, Baylor Hospital and City-County Hospital; Fellow, Southern Surgical Association and Texas Surgical Association

Electrolyte Balance in Surgery
W. P. CALLAHAN, M.D., F.I.C.S., F.A.C.S., Wichita, Kansas; Past President of the Kansas Medical Society; Former Chief of Staff of St. Francis Hospital, Wichita, Kansas

Non-Calculous Obstructions of the Extra-Hepatic Bile Ducts
WILLARD BARTLETT, JR., M.D., F.A.C.S., F.I.C.S., St. Louis, Missouri; Assistant Professor of Clinical Surgery, St. Louis University School of Medicine; Surgical Consultant U. S. Public Health Service Hospital, Kirkwood, Missouri; Surgical Consultant, Scott A.F.B., Illinois; Associate Surgeon, University Hospital; Staff Surgeon DePaul Hospital; Member of the Founders' Group of the American Board of Surgery (1937)

A Resume of Clinical Findings in 300 Thyroid Tumors
FORREST M. LINGENFELTER, M.D., F.I.C.S., F.A.C.S., Oklahoma City, Oklahoma; Clinical Professor of Surgery, University of Oklahoma School of Medicine; Chairman of Department of Surgery, University of Oklahoma School of Medicine; Member American Goiter Association

Formation of a Food Pouch from a Segment of the Jejunum as a Substitute for the Stomach in Total Gastrectomy
CLAUDE J. HUNT, M.D., F.A.C.S., F.I.C.S., Kansas City, Missouri; President Jackson County Medical Society; President of the American Goiter Association; Member of Western Surgical Association; Central Surgical Association; International Surgical Association; American Board of Surgery

Inguinal Hernia; Direct and Indirect, Then and Now, When and How
LAWRENCE W. LONG, M.D., F.I.C.S., F.A.C.S., Jackson, Mississippi; President of Staff, Mississippi Baptist Hospital; Assistant Instructor in Diagnosis, Vanderbilt University Medical School, 1926-36; Past President and Secretary Central Medical Society; Past Vice-President, Counselor and Editor Mississippi State Medical Society; Member Southern Medical Association; Member Mid-South Post-Graduate Assembly

The Surgical Peptic Ulcer
LEO J. STARRY, M.D., F.A.C.S., F.I.C.S., Oklahoma City, Oklahoma; Professor of Surgery, University of Oklahoma School of Medicine; Retiring Chairman of Surgery, University of Oklahoma School of Medicine; Chief of Staff, St. Anthony Hospital; Affiliate of University of Oklahoma; Chairman, Division of Surgery, St. Anthony Hospital, Oklahoma City, Oklahoma

Surgery of the Left Colon
NEIL W. WOODWARD, M.D., F.A.C.S., F.I.C.S., Oklahoma City, Oklahoma; Assistant Professor of Surgery, University of Oklahoma School of Medicine; Member American Proctological Society

In the evening a buffet dinner and social hour will be presided over by Dr. John E. McDonald. The official part of the evening program is as follows:

Introduction of Guests
DR. ANDRE B. CAREY

Surgery of the Oesophagus
PHILIP THOREK, M.D., F.I.C.S., F.A.C.S., Chicago, Illinois; Clinical Associate Professor of Surgery, University of Illinois; Associate Professor of Surgery, Cook County Graduate School of Medicine; Diplomate, American Board of Surgery; Fellow, American College of Chest Physicians; American Association of Anatomists; Senior Surgeon, Alexian Brothers' Hospital; Attending Surgeon, Cook County Hospital.

General News Notes

Rehabilitation Institute Proceedings Published: The Kessler Institute for Rehabilitation, West Orange, New Jersey, has started publication of an annual medical magazine containing the proceedings of the Institute. The 1952 issue was devoted to a "Clinic on Paraplegia" and was sent to plastic and orthopedic surgeons and other specialists concerned with the care of paraplegics. Henry H. Kessler, M.D., F.A.C.S., F.I.C.S., is director of the Institute and editor of the magazine.

Journal Established by American Geriatrics Society: The American Geriatrics Society announces that effective with January 1953 they will publish their own official periodical, to be called *The Journal of the American Geriatrics Society.* Dr. Willard Thompson of Chicago is President of the Society and will edit the journal. Dr. Malford Thewlis of Wakefield, Rhode Island, is Permanent Secretary. All physicians interested in diseases of the aging are invited to join the society. The new journal will be published for the Society by The Williams & Wilkins Company of Baltimore, Maryland.

Orthopedic Appliance Research Broadened: According to an announcement by Dr. E. R. Weidlein, President, Mellon Institute, Pittsburgh, the Multiple Fellowship on Orthopedic Appliances, sustained there by special grants from the Sarah Mellon Scaife Foundation, will begin its sixth year of activities on a materially broadened research and development program. During the five years in which the Fellowship has been operating thus far, major attention has been directed at the many special design and fabrication problems involved primarily in leg, arm and back braces. Only in the past year has much study been accorded to other kinds of mechanical aids for crippled and handicapped persons, and to improvements in the instrument armamentarium of the orthopedic surgeon.

Plastic Surgical Instruments Developed: *The Journal of the American Medical Association* reported on July 12 that surgical instruments made from methyl methacrylate resin (trade mark, lucite) have proved superior in many ways to their metal counterparts. Developed for use in neurosurgical operations, the transparent plastic instruments are easy to make, inexpensive, easily handled and light in weight, according to the designer, Dr. Frank T. Padberg, Department of Surgery, Northwestern University Medical School, Chicago.

Cost of Living Outruns Expense of Medical Care: The cost of medical care is lagging well behind the rapid climb of the cost of living, according to a study made by the American Medical Association's Bureau of Medical Economics Research. The data, based on statistics presented by the United States Bureau of Labor Statistics, showed that in 1951 the price index on all items in the consumers' budget rose almost twice as many points as the price of medical care.

National Gastroenterological Association Meets: The Seventeenth Annual Convention and Scientific Sessions of the National Gastroenterological Association will be held at the Hotel Statler in New York City on Oct. 20, 21 and 22, 1952.

Urology Award: The American Urological Association offers an annual award of $1000 (first prize $500, second prize $300 and third prize $200) for essays on the result of some clinical or laboratory research in urology. Competition is limited to urologists who have been in such specific practice for not more than five years and to men in training to become urologists.

The first prize essay will appear on the program of the forthcoming meeting of the American Urological Association, to be held at the Hotel Jefferson, St. Louis, Missouri, May 11-14, 1953.

For full particulars write the Executive Secretary, William P. Didusch, 1120 North Charles Street, Baltimore, Maryland. Essays must be in his hands before January 15, 1953.

Medical Press Congress: The International Medical Press Congress promoted by the periodical *Minerva Medica,* will take place in Venice, at the Civil Hospital, on Oct. 4,

1952. An Exhibition of medical periodicals published all over the world will be a feature. Relations with the press as regards information and the problems of scientific publication will be discussed. Members of the International College of Surgeons are cordially invited to attend and participate.

From October 4 to 6 the Congresses of the Italian Medical and Surgical Associations will also be held in Venice.

Federal Grants: Thirty-four Public Health Service grants, totaling $523,993, to aid cancer control studies and demonstrations in 16 States, the District of Columbia, and one foreign country, Israel, were announced today by the grants to support training in cancer diagnosis and treatment in 21 States, the District of Columbia, and Puerto Rico were announced today by the Federal Security Agency.

Surgical Journal Makes Transfer: The well-known surgical journal, *The American Surgeon,* which has been published in Atlanta, Georgia, will be published by The Williams & Wilkins Company of Baltimore, Maryland, effective with the January 1953 issue. The editor is Dr. Thomas G. Orr of Kansas City.

Medical Congress to Study European Postwar Situation: The *Congres Mondial des Medecins pour l'etude des conditions actuelles de vie* (World Medical Congress for Study of the Actual Conditions of Life) will convene in Montecatini, Italy, October 16 to 18 inclusive, 1952. The president of this organization is Prof. Pietro Verga, Director of the Institute of Anatomy and Histopathology, University of Naples, and also of the Institute for Cancer Research, Giovanni Pascale Foundation.

The meeting will discuss three principal themes: (1) the conditions of health and daily life among the European populations at present; (2) repercussions of the war upon mental and physical health, and (3) the responsibilities of the medical profession with regard to these problems. The effects of the war on nutrition, obstetrical assistance, sanitation, the care of children, and the development of disease will be studied. A meeting of unusual interest and value is anticipated.

Fellowship for Research: A new research fellowship at Mellon Institute, Pittsburgh, for long-range studies emphasizing viruses and tumors, has been established by Parke, Davis & Company. Scientists working under the fellowship also will investigate general problems in synthetic organic chemistry and chemotherapy. Methods of combating viruses and tumors through chemical means will be the immediate objective.

Public Relations for Doctors: Believing that many of the doctor's troubles with public relations begin right in his office, the American Medical Association has prepared a public relations handbook entitled "Winning Ways with Patients," intended for the doctor's secretary, receptionist, or medical secretary. The brightly illustrated booklet offers practical suggestions for reducing waiting time, billing and collecting medical fees, and working with patients. Every physician in the United States received a copy of the new booklet in August.

Egyptian Doctors on Tour: Nineteen Egyptian physicians, faculty members of Cairo medical schools, recently completed a thirty-day American tour. The trip was organized by Dr. Mohammed El Ayadi and was financed by the doctors themselves. Objectives of the tour, according to Dr. Ayadi, are to exchange professional and scientific ideas and to strengthen the bonds of Egyptian-United States friendship. Also, the group wants to pave the way between the two countries for exchange of medical students for advanced training. Egyptian students in the past usually have taken advanced work in England. The doctors inspected medical facilities in Washington, D. C., New York, Pennsylvania, Minnesota, and Michigan, and visited drug manufacturing plants in Indianapolis and Michigan.

New Books

Surgery of the Chest. By J. Johnson and C. K. Kirby. Chicago: The Year Book Publishers, Inc., 1952.

This handbook of operative surgery is intended to be primarily an atlas of thoracic surgical operations. The object of the authors is to present the step-by-step details of operative technic both in the illustrations and in the text. The methods herein portrayed are those which have proved reliable in the hands of the authors. An attempt is made to discuss the physiologic mechanisms that pertain to the various procedures; although abbreviated, this presentation is good. Also noteworthy is the importance given to preoperative and postoperative care.

The authors assume that those who will read this book have a background in general surgery; it is their desire to present the material in such a fashion that students of thoracic surgery may also find it useful.

Under "Achalasia of the Esophagus" it might have been well to mention that the Heller operation can also be performed transabdominally and that this route is preferred by most surgeons.

Although the illustrations present the material adequately in a diagrammatic way, they leave much to be desired as far as orientation, anatomic relation, and third dimension are concerned.

Particularly well written is the section dealing with pneumonectomy. In the main the material presented is good, and the book can be recommended for those interested in thoracic surgery.

P. THOREK, M.D.

Annual Report on Stress. By Hans Selye. Montreal: Acta, Inc., 1951. Pp. 511.

This volume represents the first of a series of annual supplements to the book "Stress—The Physiology and Pathology of Exposure to Stress" by the same author.

The entire literature on "stress" has been collected, and all important contributions pro and con are discussed and evaluated. The recent work on the extra-adrenal actions of ACTH, the mineralocortocoid-like effects and anti-infectious properties of STH (somatotrophic hormones) and the synergism between STH and steroids had to be incorporated into this treatise. The book is excellently organized, so that the reader can easily find the information he wants. Although it is mainly a reference book, the introductory chapters with the discussion of the general problems and an annex entitled "After thoughts" are fascinating reading.

It is interesting to note that the original work of Selye and his Montreal group, with their concept of a general adaptation syndrome as a triphased response of the body to stress, had actually no influence on the independent experimental research of the Mayo workers that led to the discovery of ACTH and cortisone. Therefore the author attempts to integrate the different observations and theories. He comes to the conclusion that the pathogenicity of many systemic and local irritants depends largely upon the function of the hypophysis-adrenocortical system. The latter may either enhance or inhibit the body's defense reaction against stressor agents. Derailments of this adaptive mechanism are the principal factor in the production of certain maladies which he calls the diseases of adaptation.

ERNEST HAASE, M.D.

The Essentials of Modern Surgery (Fourth Edition). By R. M. Handfield-Jones and Arthur E. Porritt. Edinburgh: E. and S. Livingstone Ltd., 1951. Pp. 1,263, with 641 illustrations.

This fourth edition of *The Essentials of Modern Surgery* exemplifies the same fine qualities that were responsible for establishing the splendid reputation and salability of the three preceding editions.

The present volume is well classified into fifty-one distinct sections, each part presenting a discussion of related conditions and diseases frequently encountered by the surgeon. Such an orderly presentation of material leaves little room for confusion of the student.

The work is an almost inexhaustible font of modern knowledge of surgical anatomy, diagnosis and indicated therapeutic procedures. To describe the contents take one too far afield. It can be stated, however, that the material is given as wide a discussion as possible considering the multiphasic nature of the text.

This edition, like the previous editions, embodies many excellent reproductions of photographic as well as diagrammatic illustrations. In addition there are several graphic color plates, which add considerably to the illustrative excellence of the work.

A complete and otherwise helpful subject index of 28 pages concludes this monumental contribution to modern surgical literature. This reviewer is pleased to recommend the work as an essential reference, in a single volume, to the student of modern surgery.

M. T.

Medical Terminology Made Easy. By Je Harned. Chicago: Physician's Record Co., 1951. Pp. 275.

Time was when the thorns of medical vocabulary spared all but two: the beleaguered undergrad and the nurse trainee. But the art which is long becomes ever broader, enlisting new votaries and bands of votaries—technologists, medical social workers, hospital administrators, medical librarians, records librarians, medicolegal counsel, and more. Some are blessed with the gift of tongues. Others are not, though they may be gifted in other ways.

A new treatment of medical terminology will therefore find a ready public, especially if, like the one here presented, it can serve as both text and handbook. Forewords submitted by respected educators are evidence that it is already welcome and will find academic use.

The author is medical records librarian at Duke University. The arrangement and contents of the present work reveal her authority in this field; as well as deep thought on the teaching problems involved. One cannot help admiring her easy grouping of the various types of ideas found in medical terminology. Thus, one aspect of the vocabulary is presented from the point of view of the various medical specialties. This is followed by chapters on prefixes, suffixes and stems. Then comes selected vocabulary of anatomic parts and clinical entities, arranged by body systems.

An important part of the book from a teaching point of view is the treatment of medical case records and composition. Equally useful is a fairly extensive list of abbreviations and symbols, and finally a list of lay terms with their medical equivalents.

The translations of Greek and Latin stems will also prove a boon to moderns who have little Latin and less Greek—or, more often, none of either.

Although the work is strictly a treatise and not a dictionary, we foresee that it may well serve as a supplement to the popular medical dictionaries, which are not primarily concerned with etymology. It should be given ample opportunity to prove its merits both in reference and in didactic use.

M. T.

Correlative Cardiology. By C. F. Shaffer and D. W. Chapman. Philadelphia: W. B. Saunders Company, 1952.

This is an excellent book. Much of the material is complex, but it has been presented in a clear, crisp, and concise manner. Although this manual has been prepared for students of cardiology, it could be utilized with profit by those in the general field of medicine. The correlation of anatomy, physiology, pathology and pathologic physiology is admirably presented. The numerous diagrammatic illustrations excellently amplify the ext. The differential diagnosis of the more important diagnostic entities are included.

The nomenclature for diagnosis of cardiac disease, discussed in Chapter 4, is the one adopted by the American Heart Association and correctly bears repetition here. The section dealing with the physiology of the circulation is unusually well done.

A few minor and surely not detracting criticisms might be listed as follows:

It makes for clearer reading and understanding to have the discussion of embryology precede that of anatomy.

The reviewer would have preferred to see the anatomy of the esophagus presented in its lateral and medial curves rather than postriorly.

Although artists and authors are entitled to a certain degree of "poetic license," the figure on page 71 presents an annoying disproportion between the hands of the examiner and the thoracic cage.

This book can be highly recommended not only as a reference book but as a standard text to anyone interested in cardiology.

P. THOREK, M.D.

Hospital Staff and Office Manual. By T. M. Larkowski and A. R. Rosanova. Romaine Pierson, Publisher, Inc., 1951. Pp. 413.

Unlike the usual theoretical medical text, this volume represents a concise but complete

manual type of reference to modern technics of clinical medicine, including all up-to-date laboratory procedures and recommended diagnostic and therapeutic measures, and including many of the most common and accepted surgical procedures. The authors have deliberately and effectively evaded discussions of theory, confining this work to clear and concise descriptions of procedures that have proved dependable in their personal practice.

Larkowski and Rosanova have made certain that none of the major facets of the medical profession have been overlooked. Representative of this is Chapter 16, which is devoted entirely to pediatrics. The care of the premature infant and the causes and treatment of many infantile diseases, as well as many other phases of this specific branch of medicine, are thoroughly discussed. As a matter of fact, Chapter 10 through 22 are devoted entirely to the particular field of the specialist.

In the design of this excellent work it was the purpose of the authors to provide a handy reference not only for the mature physician but for the medical student, the nurse and the laboratory technician. It contains adequate diagrammatic illustrations, well executed and excellently reproduced. An orderly, complete index concludes the work.

This reviewer is pleased to recommend *Hospital Staff and Office Manual* as a worthwhile contribution to modern medical literature and an indispensable addition to the modern medical library of the hospital or office.

M. T.

The Metabolic Response to Surgery. By Francis D. Moore and Margaret R. Ball. Diagrams by Mildred R. Codding, Springfield, Ill.: Charles C Thomas, Publisher, 1952. Pp. 156.

The authors point out that in surgery the three factors of anesthesia, asepsis and hemostasis have always been aided by a fourth, the biological response. In the field of disease as well as in surgery this response to stress has been receiving much attention, and the multiplicity of workers has resulted in a variety of methods of presenting and interpreting the facts.

Singling out the metabolic aspects of the biological response, the authors have therefore attempted to introduce some accuracy and uniformity into the concepts of quantitative changes experienced by surgical patients. To this end they have isolated some of these changes and presented their findings in uniform sets of graphs. Instructive material from the literature has been recharted by the same methods and added to the authors' original data.

These data have been provided by case records of operations for illnesses ranging from simple to terminal. Healthy controls were also utilized to isolate effects of starvation, immobilization and ACTH. Thirty cases were observed, involving 13,000 chemical analyses.

An initial chapter explains the factors to be charted, which include nitrogen, sodium and potassium balances, caloric intake, temperature, eosinophil count, weight, and 17-ketosteroid excretion. Data for six thoracic operations are followed by some cases from the literature. The authors have then attempted to "disect out" the separate influences of starvation, immobilization and endocrine factors, and also to determine their combined effect. Two chapters discuss various metabolic responses in trauma, depletion and prolonged convalescence. A chapter on factors that can change an untoward balance is concerned mainly with utilizing protein and producing a positive nitrogen balance. The authors' comments on the surgical use of testosterone and its influence on muscle mass are of some interest.

Finally a summary chapter is offered, which organizes the facts presented and derives from them some clinical corollaries.

The Metabolic Response to Surgery is an advanced and highly detailed study, which will be of most use to the advanced surgeon and medical man. It is perhaps too ponderous and technical for the student, except for one concerned with the special study of metabolic response. Such a work is of the utmost importance in the present stage of surgery, and the mature practitioner is more and more driven to an awareness of its import in daily practice. For this reason, the rules and corollaries for the care of patients deserve careful attention.

An appendix provides directions for several types of surgical diet, and an excellent bibliography of the literature fills in the background for further study.

M. T.

Abstracts from Current Literature

The Results of Partial Gastrectomy for Peptic Ulcer. Pulvertaft, C. N., Lancet 1: 225, 1952.

This report is based on 632 cases in which gastrectomy was performed for gastric and duodenal ulcer which were carefully assessed by a board at definite intervals and in whom an antecolic Polya type of procedure was carried out. By and large, 50 to 75 per cent gastrectomy was performed on all patients. The group consisted of 551 male and 81 female patients. In the latter the resection was less radical than in the former.

In 5 of the patients ulcerations developed. Most of them were noted in patients on whom the Billroth I type of gastrectomy had been performed. A more radical Polya procedure was executed for postoperative gastrojejunal ulcer, with excellent results.

Some of the postoperative complications noted in the series were regurgitation of bile, postprandial distress and the dumping syndrome. The last-mentioned disturbing but stubborn sequela tends to become worse and difficult to ameliorate.

In the main, the author's results can be summarized as good in 75 per cent of cases, fairly good in 16.3 per cent and poor in 9 per cent. Careful analysis of the series bears out that, on the whole, gastrectomized patients in the extreme age group had the most complications and the least gratifying results. It was in the middle-aged group that the best clinical results were obtained.

The influence of the extent of resection on the results is unequivocal. No perceptible postoperative sequelae were noted whether 50 per cent or 75 per cent resection was performed. In the majority, however, the results were less satisfactory in women than in men, obviously because of a greater susceptibility to somaticism.

S. L. GOVERNALE, M.D.

Experimental and Clinical Experiences with the Use of Fascia Lata Applied as a Graft About Major Arteries After Thrombo-Endarterectomy and Aneurysmorrhaphy. Wylie, E. J., and Davies, O., Surg., Gynec. & Obst. 93: 257, 1951.

The authors present a very good description of the various steps in the development of surgical treatment of the blood vessels, especially as it pertains to the restoration of patency of chronically occluded sclerotic arteries. This work seems to have been started by the French surgeons who inaugurated the method of incising the involved artery longitudinally and then stripping out the diseased intima and portions of the media with the adherent clot or accumulation of cholesterol, fatty acid salts and tissue débris that settles on these diseased areas of the artery.

The use of sleeves of fascia lata to overlap this segment of the artery has greatly lessened the tendency to hemorrhage and to ballooning out or rupture of the arterial segment operated on.

This sleeve operation was first done on 15 dogs with use of some of the main arteries and the aorta. After observing the very good results of these experimental operations, the authors used the same procedure on 7 patients, 1 of them having a large aneurysm of the abdominal aorta. Two of these 7 patients died in the postoperative period from cerebral vascular thrombosis, and amputation was eventually necessary in 2 patients, owing in 1 case to chronic thrombosis of the distal arteries, too small to be amenable to surgical treatment, and in the other to the prolonged treatment between the onset of acute thrombosis and operation.

Microscopic sections demonstrated that the traumatized intima was first covered by a thin layer of blood clot and then, as organization went forward, connective tissue was laid down, ending in an endothelium-like surface.

This work seems to represent a great advance in the realm of vascular surgery.

E. L. JEWETT, M.D.

A New Operation for Chronic Peptic Ulcer. Aylett, S. O., Brit. M. J., 1:454, 1951.

This paper postulates the need for a new operation for ulcer, based upon the mutilating nature of gastrectomy, the sequelae, minor and major, attendant upon it and the enthusiasm with which vagotomy was received as an alternative. Theoretically, the author is trying to reduce gastric acidity permanently by bringing about a free admixture of bile with gastric contents, this being infrequent in gastroenterostomy, as the bile simply passes over the spur into the distal loop with-

out entering the stomach to any degree and explaining the frequent failure of gastroenterostomy. A type of exclusion operation is developed, the pylorus being divided on its duodenal side and the duodenum closed with the ulcer left *in situ*. The jejunum is divided 8 cm. from the duodenojejunal flexure; the distal end is anastomosed to the stump of the stomach, and the proximal end to the anterior wall of the stomach, high up toward the left. This retains the stomach intact, brings about free admixture of its contents with bile and provides a pyloric outlet. The paper discusses the advisability of resecting or leaving the ulcer. Leaving it does not seem to be a matter of concern. Both anastomoses are anterior to the transverse colon.

Thirteen cases are mentioned, none in detail. All of the patients are well except 2, who have minor receding discomforts, such as nausea. All are recent cases, with a follow-up of months only, and the late results cannot be assessed. The operation represents a conservative approach to the surgical treatment of ulcer, and the theory on which it is based is not unsound. Three operative illustrations are presented.

LYON H. APPLEBY, M.D.

Surgery of the Spleen. Whitby, L., Lancet. 1:623, 1952.

Splenectomy provides an effective treatment for a number of medical conditions for which there is not and has never been a medical treatment. Many questions concerning the spleen are answered by impressions rather than by established facts. The spleen does have a hemopoietic function in the embryo and the fetus, acts as a reservoir for blood, and contains reticuloendothelial cells which have a phagocytic activity. The spleen also has a chemical or a hormonal function, disturbances of which may be successfully treated by splenectomy.

The spleen will ingest and destroy abnormal red blood cells, and probably abnormal leukocytes and platelets may be similarly selected for destruction by reason of their abnormality. Splenectomy is successful when cells are thick, as in the presence of congenital hemolytic icterus, but useless when cells are thin or sickled, as with Mediterranean or Cooley's anemia and the sickle cells of African anemia.

In cases of congenital hemolytic icterus it is known that the cells are abnormal, since they do not survive when transfused to a normal person. The cells are spherocytic, and usually no antibody of the lytic type can be demonstrated. Splenectomy is advised for this condition.

In cases of acquired hemolytic icterus it is recognized that the cells are normal but subject to destruction by a circulating hemolysin, which can usually be demonstrated indirectly by the Coombs's test. If spherocytes are present, splenectomy offers a good prospect of cure. Otherwise it is preferable not to operate during an acute and febrile phase, but to tide the patient over with transfusions if it is possible to obtain a donor whose cells are not sensitive to the patient's hemolysin. This hemolysin is thought to arise at least in part from splenic tissue. Cures of both types of hemolytic anemia appear to be clinical rather than biological as the spherocytes are retained and usually the Coombs's test continues to give a positive result.

Increased phagocytic activity of the spleen leading to anemia with hemolytic features is sometimes observed in cases of Hodgkin's disease and other reticuloses and Gaucher's disease. Splenectomy is justifiable and may be symptomatically beneficial.

Hypersplenism may not be confined to envolvement of the red cells; there may be a combined excessive phagocytosis affecting leukocytes or platelets. This results in the picture of panhematopenia. The criteria for establishing this state are by no means clear. In practice there is no doubt that in the presence of unexplained and intractable or refractory anemia for which no treatment other than repeated transfusion) is effective, the diagnosis must be considered.

Patients who have responded to splenectomy have all exhibited the paradox of apparent aplastic anemia and definite normoblastic hyperplasia of the marrow.

Similarly, with chronic unexplained granulocytopenias a certain proportion of successes may be expected. The part played by the spleen in idiopathic thrombocytopenic purpura has never been properly determined. The fault may arise from hypersplenism in the form of excessive destruction of platelets by the spleen or from splenic inhibition of formation or release of platelets from the bone marrow. One purpuric state is very much like another, and it is difficult to differentiate those purpuras which are idio-

pathic or splenic in origin from those which have an allergic or endocrine origin.

Splenectomy during the acute phase of thrombocytopenic purpura carries a considerable operative risk. A pint of fresh blood may be worth 2 or 3 pints of the preserved variety in converting the acute thrombocytopenic purpura into the chronic phase, in which surgical intervention is much safer. Evidence that a hemorrhagic patient may be cured by splenectomy is supplied by Hess's test, which is an unequivocal reduction in the platelets—i.e., well below 100,000 per cubic millimeter—and a careful examination of the marrow, which should reveal, if not increased numbers, at least reasonable numbers of megakaryocytes which seem less mature than normal and exhibit little or no evidence of platelet formation.

Sometimes similar criteria may be found discovered in the presence of purpuras which are obviously secondary to reticuloses, to reticulosarcoma, or to Gaucher's disease, and in Banti's syndrome. In such circumstances splenectomy is justifiable, since it may relieve an unpleasant and worrying symptom, but it has no effect whatever on the primary disease.

Simple splenectomy for Banti's disease has been completely discouraging. The author suggests that the operation is now performed only as a part of a larger vascular readjustment.

H. J. ROSEVEAR, M.D.

Multiple Balloon Kymograph Recording of the Effect of Banthine, Belladonna and Placebos on Upper Intestinal Motility. Chapman, W. P.; French, A. B.; Hoffman, P. S., and Jones, C. M., New England J. Med. **246**:435-443, 1952.

The actions of orally administered banthine, tincture of belladonna, and placebos were studied to determine the effect of each upon the motility and tonus of the upper part of the gastrointestinal tract in healthy adult men. By introducing a multiple-lumen tube to which three distal balloons were attached, it was possible to pass this tube fluoroscopically so that the motility and tonus of the stomach, the duodenum and the upper part of the jejunum could be noted by their effect upon an indwelling air-filled balloon placed within each of the respective areas studied. The air-filled balloons were then connected to a kymograph recording device so that changes in the tonus or contractions of the circumjacent bowel would be noted on the kymographic drum. By this method changes in propulsion, total contractions, both propulsive and nonpropulsive, and tonus were determined.

Banthine caused a striking decrease in propulsive and total contractions and a slight to moderate decrease in tonus. It also acted more rapidly and inhibited motility to a greater degree than did tincture of belladonna. Both the banthine and the tincture of belladonna produced greater effects than were noted after the administration of placebos. Side effects, such as dryness of the mouth and increase in heart rate, were more noticeable with banthine than with tincture of belladonna.

Although banthine was shown experimentally to compare favorably with tincture of belladonna in its inhibitory action upon intestinal motility, the authors express the opinion that only a long-term clinical trial would indicate which of the two agents, banthine or tincture of belladonna, is most efficacious in sustained treatment of gastrointestinal disorders.

M. O. CANTOR, M.D.

A Simple Bedside Test for Liver Function. Woolf, C. R.: South African M. J. **25**:789 (Nov. 3), 1951.

The author used a test developed by Mallen for abnormalities in serum proteins. A drop of serum is mixed with a drop of strong Lugol's solution, and if precipitation occurs the result is positive. In a series of 235 tests, there were 222 negative results for patients whose history and examination in no way suggested hepatic disease. The iodine test was then checked on 116 patients against the results of A : G ratio, thymol turbidity, thymol flocculation and colloidal gold liver function test. If the result of the iodine test is positive, one or more of these tests will probably also give positive results. If the iodine test gives a negative result, it is most probable that all of the other tests will result in the same. The iodine test appears to be a good test in that there is little overlapping between a negative and a definitely positive test.

Distribution graphs indicate the unreliability of these liver function tests and suggest that the iodine test is the most dependable. Examples of discrepancies are given and suggest that where the iodine test is negative and one of the other tests disagrees, the iodine test result is the more likely to be acceptable.

H. J. ROSEVEAR, M.D.

In Memoriam

BERTHA VAN HOOSEN

M.D., F.A.C.S., F.I.C.. (HON.)

Dr. Bertha Van Hoosen, surgeon and obstetrician, who performed her last operation in Chicago a little more than a year ago when she was 88 years of age, died on June 7 at her farm in Romeo, Michigan, after a long illness. She was said to be the world's oldest woman physician.

Dr. Van Hoosen's death ended a medical career that stretched over sixty-four years, from the day she was graduated from the University of Michigan Medical School in 1888. She moved to Chicago in 1892 and quickly won recognition and a substantial practice. She was appointed emergency physician for the World's Columbian Exposition in 1894 and thereafter was associated with numerous Chicago hospitals and taught in the medical schools of four universities—Northwestern, Loyola, Illinois, and Michigan. When for the first time civil service competitive examinations were given in 1913 for positions on the gynecological staff of Cook County Hospital, she was the only woman among 300 aspirants, and after receiving the highest mark of them all she was made head of the gynecologic staff.

She was the author of "Petticoat Surgeon," an autobiographic best seller, and of other books and articles. She was instrumental in establishing the Mother's Milk Bureau, and was the only woman aside from Mme. Marie Curie to be elected an honorary member of the International Association of Medical Women. She received an honorary fellowship from the International College of Surgeons in 1949.

CLAUDE ALBERT ROBB

M.D., F.I.C.S.

Dr. Claude Albert Robb of Butler, Pennsylvania, member of the general surgical staff of Butler County Memorial Hospital, died on Feb. 25, 1952, at the age of 67.

Dr. Robb received a Ph.B. degree from Grove City College, Grove City, Pennsylvania, and his M.D. degree from the University of Pennsylvania. He did postgraduate work at Roosevelt Hospital, Rockefeller Institute, and Postgraduate Hospital of New York. During the first World War he was operating surgeon and in charge of the Accident Ward of the U. S. Army Embarkation Hospital at Newport News, Virginia. He received his Fellowship in the International College of Surgeons in 1945.

WALTER WOLFE SILBERMAN

M.D., A.I.C.S.

Dr. Walter Wolfe Silberman of Chicago died of a heart attack on July 10, 1952, at the age of 53.

Dr. Silberman received his M.D. degree from Northwestern University Medical School in 1924 and did postgraduate work at Cook County Graduate School of Medicine, where he was later a clinical instructor. He was a general surgeon and an Associate Member of the International College of Surgeons.

HENRY A. BEAUDOUX

M.D., F.I.C.S.

Dr. Henry A. Beaudoux, a Fellow of the International College of Surgeons since 1937, died at the age of 80 on May 20, 1951, at Saratoga, California, according to word recently received. Dr. Beaudoux was formerly oculist and aurist for the Great Northern and Northern Pacific Railways, having been located formerly in Oakland and later in San Jose. He received his M.D. degree from the University of Minnesota in 1895. He was a member of the American Academy of Ophthalmology and Otorhinolaryngology.

JOHN RUSKIN HAWKINS

M.D., A.I.C.S.

Dr. John Ruskin Hawkins of Elmhurst, Illinois, obstetrician and gynecologist, died at the age of 54 on July 15, 1952.

Dr. Hawkins was chairman of the obstetrical and gynecologic staff at Memorial Hospital of Du Page County in Elmhurst. He served as a medical officer in the European theater in both World Wars. He was graduated from Rush Medical College in 1927 and was made an affiliate member of the International College of Surgeons in 1947.

The Journal of the International College of Surgeons

FOUNDED IN GENEVA, SWITZERLAND, 1935 - INCORPORATED IN WASHINGTON, D. C., 1940

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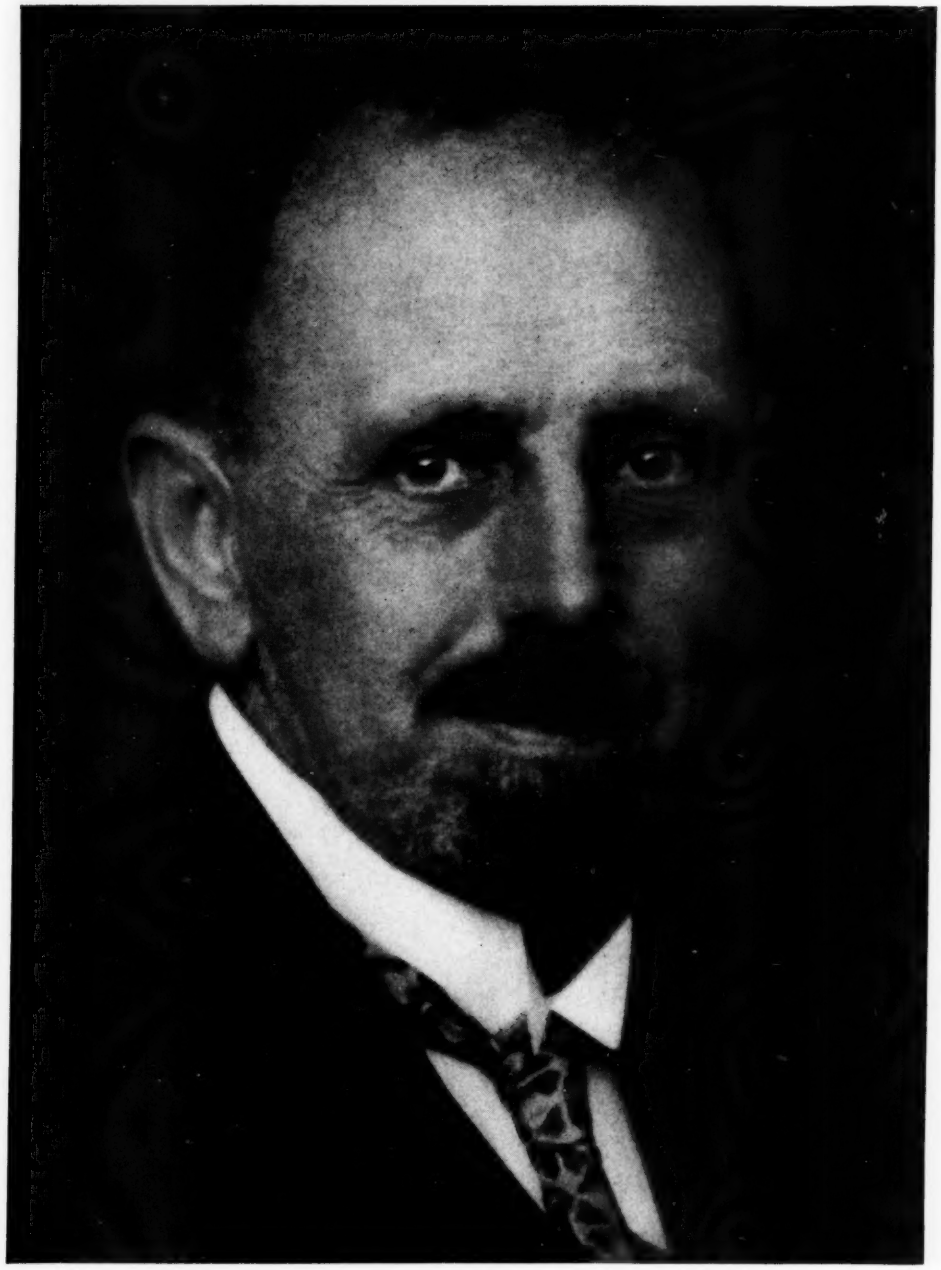

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